EVALUATION OF A LAKE TROUT INTRODUCTION AND ANGLER USE AND FISH HARVEST SURVEY AT DEERFIELD RESERVOIR, SOUTH DAKOTA, 2015-2017

by

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South Dakota Department of Game, Fish and Parks
Rapid City Regional Office

Completion Report

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PREFACE

This is a completion report. Copies of this report and reference to the data can be made with written permission of the author, Director of the Division of Wildlife, or the Secretary of the South Dakota Department of Game, Fish and Parks, Pierre, South Dakota 57501-3182.

The author would like to acknowledge the following individuals who assisted with the data collection, data entry, and editing this manuscript: Bill Miller, Greg Simpson, Jeremy Kientz, Michelle Bucholz, Alex Trautman, Austin Galinat, Macy Jo Murren, Cody Sack, Tanner Urbaniak and anonymous reviewers.

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EXECUTIVE SUMMARY

This report summarizes introductory lake trout stockings and angler use, harvest and preference data collected at Deerfield Reservoir in Pennington County, South Dakota during 2015, 2016 and fall 2017. Also referenced are angler use and harvest data from previous angler surveys from 2009 and 2010.

Since 1993, Deerfield Reservoir has been managed under a length restriction of only one trout in the daily possession over 14-inches and in 1997 the daily possession limit was reduced from 8 trout to the current limit of 5 trout. Fisheries management in Deerfield consists of annual stockings of rainbow trout; however, adult lake trout were stocked in spring and fall of 2015 and again in fall 2016 to provide angler opportunity to catch trophy sized fish and potentially add a predatory pressure on the overly abundant panfish populations.

To assess the newly introduced lake trout, trap nets were used during October 2016 and October 2017. Forty lake trout were caught, tagged and released in 2016. Thirty six of the lake trout caught were from the 2015 stockings. In 2017, 42 lake trout were sampled. Twenty three of the fish were from the 2015 stockings and 19 were from the 2016 stocking, indicating survival from both years. Lake trout condition does appear to be declining. Average relative weight of the fish in 2016 was 86.3, which dropped to 77.0 in 2017.

An angler use survey was conducted from November 1, 2015 through October 31, 2016. A total of 1,097 anglers were contacted by creel clerks throughout the 12 month creel. During the survey anglers spent an estimated 36,760 hours fishing Deerfield Reservoir. Seasonally, February and July were the winter and summer months receiving the highest fishing pressure. The average size of angler group was two and the average fishing trip lasted 3.3 hours.

Fish species most targeted by Deerfield anglers were rainbow trout (34.8% of anglers) and yellow perch (29.7%). The newly introduced lake trout also had a large number of anglers targeting them (11.7%). Yellow perch were the most caught (37,380 estimated fish) followed by rockbass (25,380) and rainbow trout (13,735). The most harvested fish species were yellow perch (22,004 estimated fish) followed by rainbow trout (5,287). While rockbass were a highly caught fish, only an estimated 18 were harvested through the 12 month creel survey.

Most anglers were male (83.2%) and over 20 years old (85%). Anglers ranging in ages 20-39 made up 33.5% of the total anglers while anglers over 40 made up 51.5% of anglers. Anglers from fourteen states fished Deerfield during this creel with a large majority (91.8%) being South Dakota residents.

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INTRODUCTION

Deerfield Reservoir is the second largest reservoir in the Black Hills of South Dakota and a popular lake for anglers. The reservoir is primarily managed for rainbow trout (*Oncorhynchus mykiss*); however, rock bass (*Ambloplites rupestris*) and yellow perch (*Perca flavescens*) have become established in the lake and tend towards dense populations of small sized fish (Miller et al. 2009). It is assumed that few anglers fish for rock bass, but many target yellow perch, especially during the ice fishing season. In addition to yellow perch and rainbow trout, anglers have also targeted splake (*Salvelinus fontinalis* × *Salvelinus namaycush*) and during the mid-2000's the splake state record was broken three times (SD GFP unpublished data). While splake have shown potential to reach large sizes, very few appear to survive to trophy sizes in Deerfield Reservoir (Miller et al. 2010). Lake trout (*Salvelinus namaycush*) are a popular trophy managed sportfish at Pactola Reservoir and requested by anglers as a potentially desired species in Deerfield Reservoir (Simpson et al. 2015). Due to angler interest, a potentially favorable environment in Deerfield (Meiers *in press*), and the recent availability of trophy size (>5 lbs) adult lake trout from a federal hatchery, lake trout were stocked in 2015 and 2016.

This report summarizes a fish survey assessment of the stocked lake trout as well as a 12 month angler use survey to determine angling pressure, catch and harvest rates, and angler attitudes towards the fishery at the reservoir. Angler use surveys were also conducted in winter 2006-2007 and during summer in 2009 and again in 2010. Data from the previous surveys are referenced for comparisons in some portions of this report.

OBJECTIVES

Fall netting was accomplished to assess the success of the lake trout stockings. Objectives of the survey were to:

1. determine if successful carryover of lake trout stockings is occurring
2. measure and compare lake trout body condition values

Objectives of the angler survey were to collect angler attitudes and catch and harvest data that is statistically accurate and can be used to implement an appropriate fishery management plan at Deerfield Reservoir. Specifically, this angler survey was intended to provide information and estimates of:

1. angling pressure, angling party size and mean trip length
2. angler catch, harvest and release rates by fish species
3. size structures of harvested fish
4. angler demographics and residency
5. angler preferences and satisfaction
6. angler attitude toward the recent lake trout introduction
7. angler support for potentially implementing a more restrictive lake trout regulation

STUDY SITE

Deerfield Reservoir is located in the central Black Hills of western South Dakota and lies approximately 43 road miles from Rapid City. The reservoir has a surface area of approximately 435 acres at the top of conservation pool and volume of 15,654 acre feet. The reservoir is formed by Deerfield Dam on Castle Creek (Figure 1). Mean depth of the reservoir is around 35 feet and maximum depth is approximately 95 feet. Water releases from the reservoir are maintained by the City of Rapid City for municipal and irrigation purposes.

The Deerfield Reservoir watershed consists of approximately 95 square miles of forested land located within the Black Hills National Forest. The United States Forest Service (USFS) has management authority on approximately 75% of the watershed and the remaining 25% is controlled by private landowners. A small portion of the privately owned land is cultivated and most of the remaining private land is open meadowland used for grazing or haying interspersed with coniferous forest.

Vegetation density in most of the reservoir is low. In the shallow ends of most bays and at the inlet of Castle Creek and Gold Run Creek, small concentrations of heavy vegetation are present throughout the summer and fall. Minor input of silt and nutrients washes into Deerfield Reservoir from Castle/Ditch Creek and Gold Run Creek as well as other smaller drainages.

Deerfield Reservoir provides both cold and cool water species for anglers. Rainbow trout are the primary managed sportfish and harvest is restricted by an aggregate regulation on all salmonids of 5 daily with only one trout over 14 inches. Yellow perch also provide a substantial fishery for anglers while brook trout (*Salvelinus fontinalis)*, splake and lake trout are also sought by Deerfield Reservoir anglers. Other fish species in the reservoir include: brown trout (*Salmo trutta*), creek chub (*Semotilus atromaculatus*), golden shiner (*Notemigonus crysoleucas*), lake chub (*Couesius plumbeus*), rock bass and white sucker (*Catostomus commersoni*).


Figure 1. Aerial photo of Deerfield Reservoir.

METHODS

Lake Trout Stocking and Survey

Lake trout were introduced into Deerfield Reservoir in April 2015 with additional stockings in November 2015 and October 2016. The stocked lake trout were large hatchery brood fish averaging 8 lbs/fish in April 2015 and 5 lbs/fish in November 2015 and October 2016. During April, 60 adult female lake trout were stocked followed by 763 mixed gender fish in November and 400 mixed gender fish in October 2016. During the 2016 stocking, all the newly added lake trout (N=400) were adipose clipped to differentiate them from the 2015 stockings.

Fall trap netting in 2016 and 2017 was used to assess the lake trout population. Trap nets in 2016 were fished from October 11th through October 20th and totaled 56 trap net nights. Eighteen short-term gill nets (1 -2 hour sets) were used on October 11th and 12th, 2016 but only two lake trout were caught during this period and gill nets were discontinued. The 2017 sampling consisted of 24 trap net nights total, fished from October 16th to October 20th. Population size was calculated using the 2017 trap net data and Schnabel method (Schnabel 1938). Captured lake trout were dorsally tagged with a floy tag in 2016 and Passive Integrated Transponder (PIT) tagged in 2017 to mark

individual fish. In addition to catch data, all lake trout were measured to the nearest millimeter and weighed to the nearest gram then released.

Angler Use and Harvest Survey

To assess catch and harvest of all fish species and angler attitudes towards the Deerfield Reservoir fishery, a 12 month angler use and harvest survey was conducted from November 1, 2015 through October 31, 2016. The November start date was chosen to coincide with the month of the second stocking of lake trout. In addition, previous angler surveys occurred in winter 2006-2007, summer 2009 and summer 2010 and pressure estimates are compared in this report. All data was analyzed using CAS (Creel Application Software, Soupir and Brown 2002).

The surveys consisted of two separate components: angler counts and angler interviews. Progressive counts were driven along one side of the reservoir to estimate fishing pressure. All shore anglers and open ice anglers actively engaged in fishing were counted individually. All boats and ice shacks with anglers actively fishing were counted and the number of individuals fishing was acquired through angler interviews. Interviews were conducted with as many anglers as possible between counts. Interviews consisted of a series of questions to estimate catch, harvest and release rates.

The creel surveys were two-stage stratified roving surveys. The first unit of stratification was between weekend/holidays and weekdays. Since increased fishing pressure typically occurs on weekend days and holidays, extra effort was given to sample nearly all weekend days and holidays each month. The second unit of stratification was time periods the clerks were at the reservoir. During the summer, work shifts were 8 hours with two time periods (early: 7AM to 3PM and late: 1PM to 9PM) randomly assigned to randomly selected days. Due to fewer daylight hours during winter months, shifts were 10 hours and the two time periods overlapped (early: 6:30AM to 4:30PM and late 8:30AM to 6:30PM). Pressure counts were conducted 2 times during each shift. Pressure count times were randomly selected on the hour for two counts within each time period.

RESULTS AND DISCUSSION

Lake Trout Stocking and Survey

A total of 1,223 brood stock hatchery lake trout were stocked into Deerfield Reservoir in 2015 and 2016. The lake trout were large, averaging 5 to 8 pounds and are protected by a Black Hills-wide harvest limit of five trout (all species combined) daily and only one can be over 14 inches (356 mm).

Trap netting in October 2016 collected 38 lake trout ranging in length from 524 mm to 733 mm (Figure 2). Trap nets in October 2017 collected 44 lake trout ranging from 517 mm to 749 mm (Figure 3). Thirty-six of the 38 lake trout sampled in 2016 were from the 2015 stockings and in 2017 24 of the lake trout were from the 2015 stockings and 20 were from the 2016 stocking. The Schnabel population estimate indicated around 104 (40-414; 95% CI's) lake trout in the reservoir. This number likely underestimates the population as a few assumptions of the model were possibly infringed on, such as, only one sampling gear used and locating nets around the entire reservoir was not possible

due of steep shorelines. No evidence of reproduction has been observed, but during sampling lake trout were producing milt and eggs.

Most weights of Deerfield lake trout were below the average standard weight for lake trout in North America (Piccolo et al. 1993; Figure 4), but condition (relative weight [*Wr*]) was still fairly good in 2016 with a mean *Wr* of 87.9. Average condition of the fish stocked in 2015 (*Wr* = 86.2) was significantly lower than the 2016 fish (*Wr* = 103.1)(*t* = 2.36, df = 7, *P* = 0.009), suggesting condition decreases for most lake trout as they adjust to living in the reservoir. Weight at length (i.e. condition) dropped significantly further in 2017 (Figure 5)(Wr = 77.0, *t* = 2.01, df = 48, *P* = 0.0002). Potentially condition has reached its lowest as *Wr*'s of fish sampled from the 2015 stockings (mean *Wr* = 77.0, N = 23) was the same (*t* = 2.02, df = 37, *P* = 0.99) as fish sampled from the 2016 stocking (mean *Wr* = 77.1, N = 19). A decrease in condition was expected due to change in diet from scheduled hatchery foods to foraging on fish and invertebrates. The drop in average condition however, is still concerning and introductions of other potential forage fish could prove beneficial.

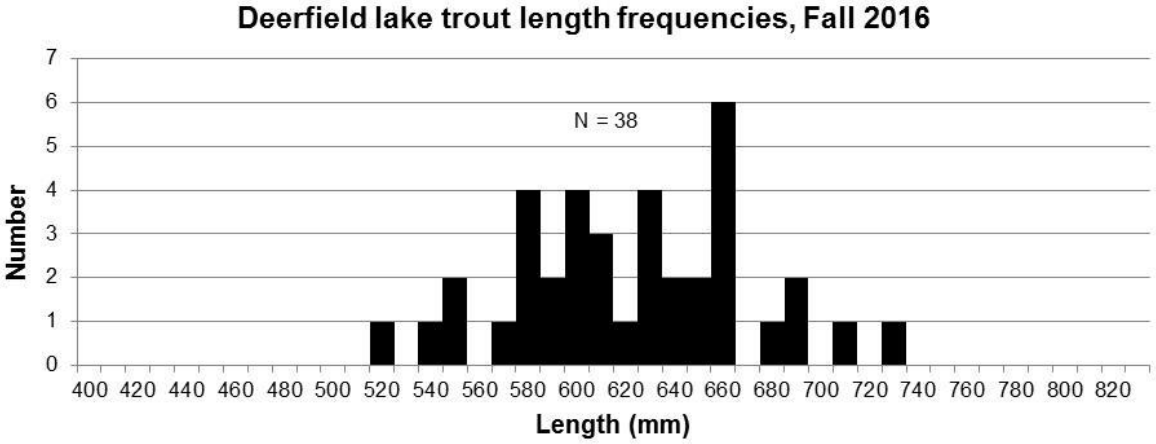

Figure 2. Total lengths (mm) of lake trout collected during fall trap netting at Deerfield Reservoir, October 2016.

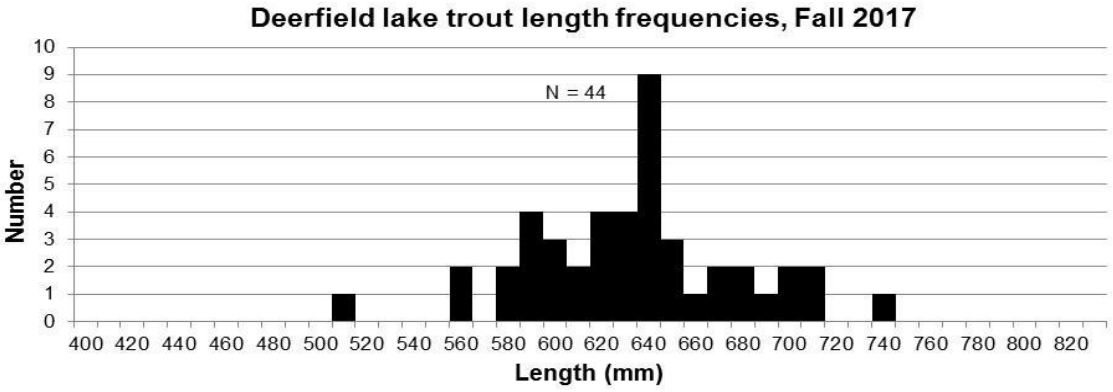

Figure 3. Total lengths (mm) of lake trout collected during fall trap netting at Deerfield Reservoir, October 2017.

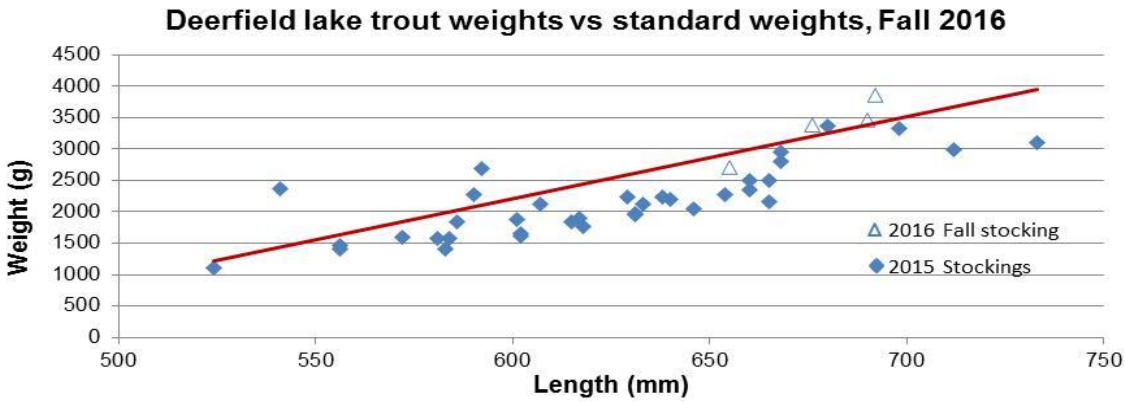

Figure 4. Weights (g) of lake trout collected from Deerfield Reservoir, October 2016. The red line is the standard weight for lake trout in North America.

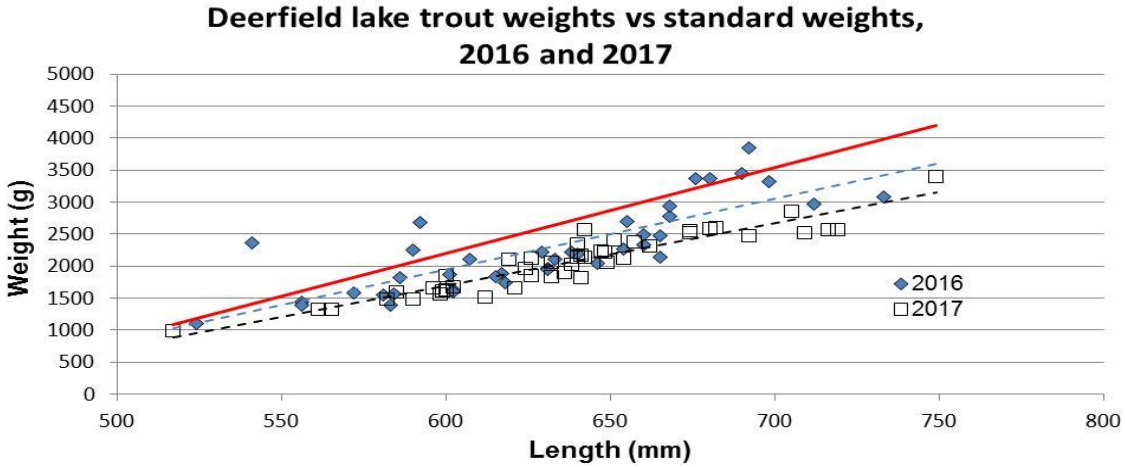

Figure 5. Weights (g) of lake trout collected from Deerfield Reservoir in 2016 and 2017. The red line is the standard weight for lake trout in North America. The blue dotted line is linear data for 2016 weights and black dotted line is linear data for 2017 weights.

Angler Use and Harvest Survey
Fishing Pressure

Total estimated fishing pressure on Deerfield Reservoir during the 2015-2016 angler survey was 36,760.5 hours (Table 1). The month with the highest estimated angling pressure was February, followed by January, indicating Deerfield appears most popular for anglers in the winter (Figure 6). Both months were also split nearly equally between anglers fishing in shacks and anglers fishing without shacks (Figure 7). July was the summer month that experienced the highest pressure which was also the month with substantially more boat angling occurring. Shoreline angling pressure was highest in May and appeared to decrease each month throughout the summer. Monthly total fishing pressure was higher in May and August during 2010 but very similar in 2009 and 2016 (Figure 8). During June and July, monthly angling pressure was very similar in all three years. Total fishing pressure has remained nearly the same during winter months of 2006-2007 and 2015-2016 (Figure 9). Monthly fishing pressure was different, however, with February 2016 receiving a bulk of the fishing pressure during this survey.

Weekend angling pressure totaled 22,148.8 hours (±3,391.7 hours; 80% CI) and weekday pressure totaled 14,575.7 (±1,817.8; 80% CI) during the 12 month survey. The month with the highest weekend pressure was February which was also the month with the highest weekday pressure (Figure 10). The month with the lowest estimated fishing pressure for both weekends and weekdays was November which is likely explained by changing weather and the formation of ice noted by creel clerks that would inhibit angling opportunity.

Table 1. Estimated total angler hours for the different angling types interviewed at Deerfield Reservoir, November 1, 2015 – October 31, 2016. Confidence intervals (80%) are in parentheses.

Angler type	Estimated Angler hours (with 80% CI's)
Boat	10,502 (1,711)
Shore	8,196 (1,373)
Open Ice	9,666 (1,614)
Ice House	8,396 (1,932)
TOTAL	**36,761 (3,848)**

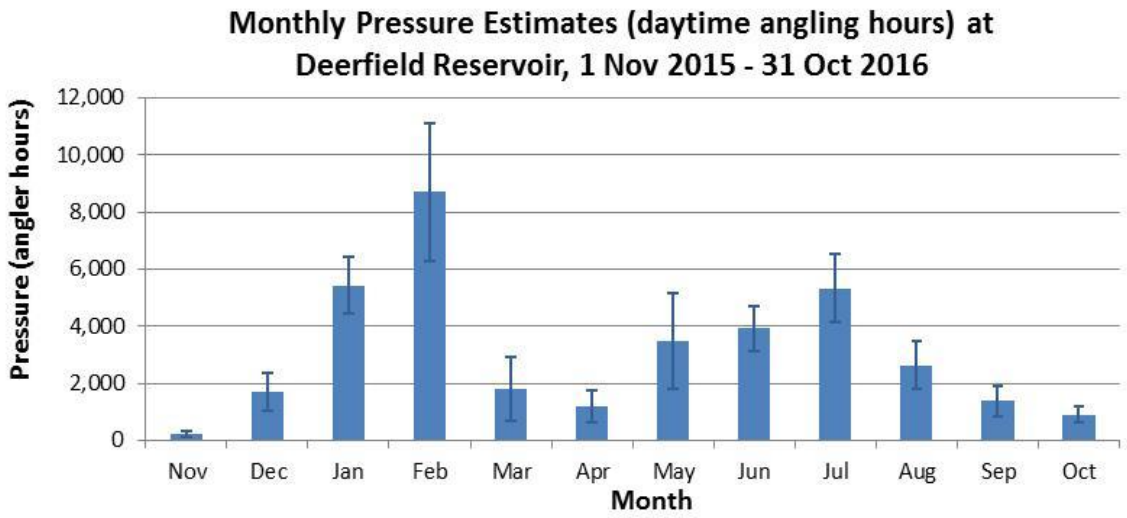

Figure 6. Estimated angling pressure (hours; with 80% CI's) by month at Deerfield Reservoir.

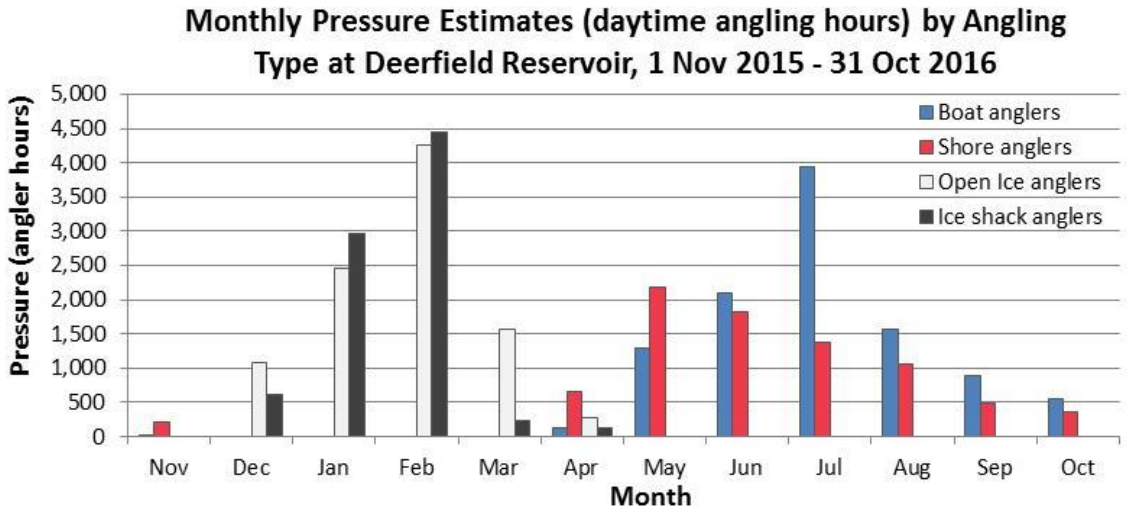

Figure 7. Estimated angling pressure (hours) by angling type for each month at Deerfield Reservoir.

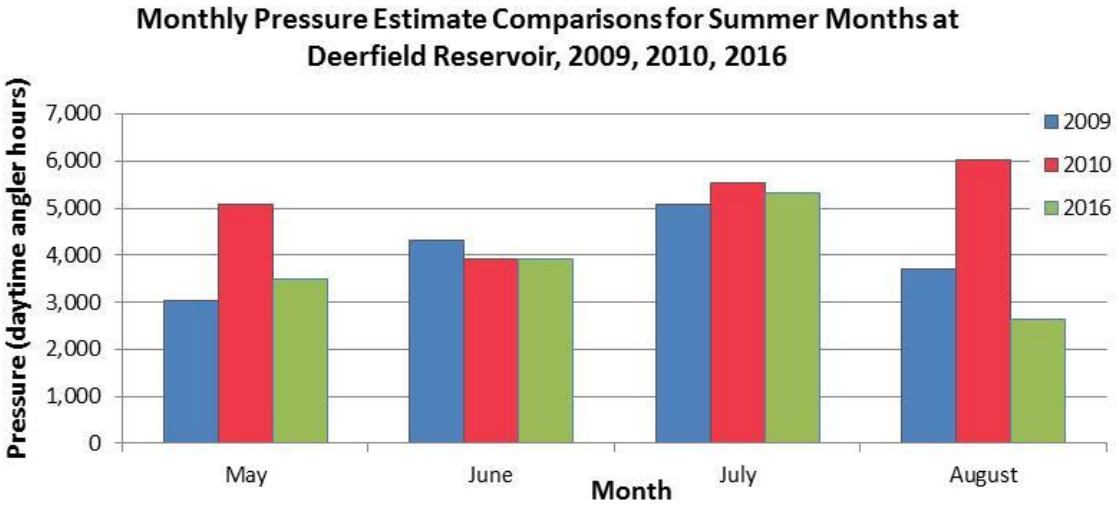

Figure 8. Estimated angling pressure (daytime hours) by month from May through August at Deerfield Reservoir in 2009, 2010 and 2016.

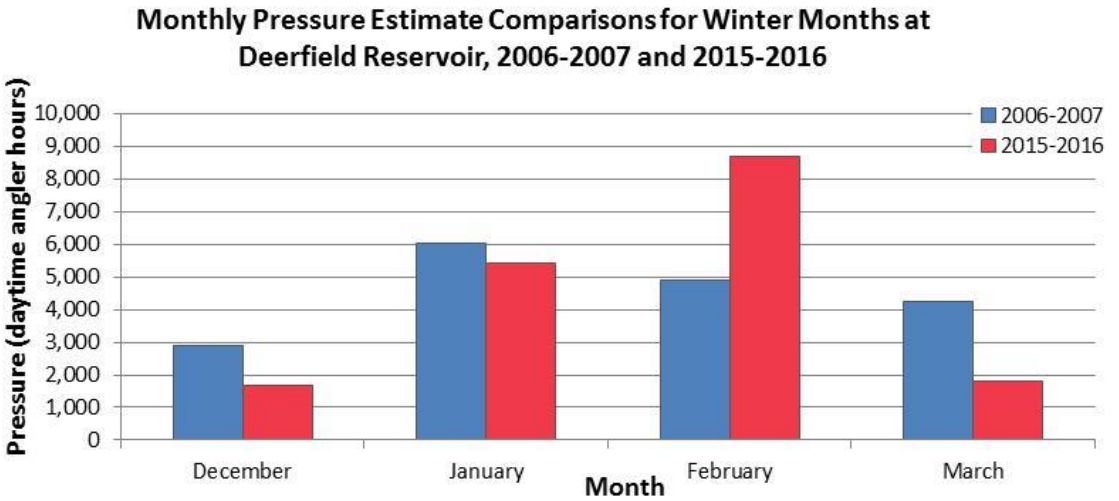

Figure 9. Estimated angling pressure (daytime hours) by month from December through March at Deerfield Reservoir in 2006-2007 and 2015-2016.

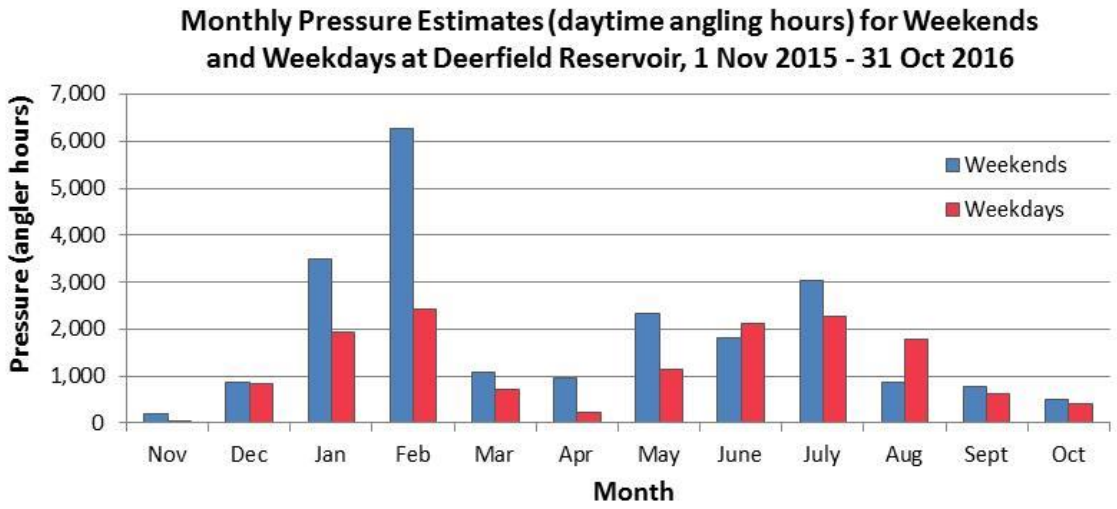

Figure 10. Estimated angling pressure (hours) by day type (weekend or weekday) for each month at Deerfield Reservoir.

Party Size/Trip Length

Five hundred one completed interviews were accomplished at Deerfield Reservoir during this angler survey (Table 2). Mean trip length was 3.3 hours and mean party size was just over 2.0 people. Ice shack anglers tended to fish longer at 4.53 hours and shore anglers tended to fish in slightly larger groups with an average party of 2.35 anglers. Summer angling tended to have larger mean group sizes than the winter months, probably due to the large amount of camping and vacationing groups observed at the lake in summer. Group sizes ranged around 2 people throughout the survey with means of 1.5 people in November to just over 2.5 in June (Figure 11). Trip length was near 3 hours or longer in most months with July anglers noticeably spending the least amount of time fishing (Figure 12). The July dip in trip length is most likely due to other planned activities of vacationing anglers as trip length did not appear to relate to catch rates during this survey.

Table 2. Number of completed interviews and estimated mean trip length and mean party size for different angling types interviewed at Deerfield Reservoir, November 1, 2015 – October 31, 2016. Confidence intervals (80%) are in parentheses.

Angler type	N	Mean trip length (hours; with 80% CI's)	Mean party size (with 80% CI's)
Boat	86	3.55 (0.36)	2.09 (0.15)
Shore	150	2.47 (0.34)	2.35 (0.23)
Open Ice	192	3.63 (0.50)	1.88 (0.27)
Ice House	73	4.53 (0.59)	2.05 (0.30)
Total	**501**	**3.30 (0.55)**	**2.04 (0.39)**

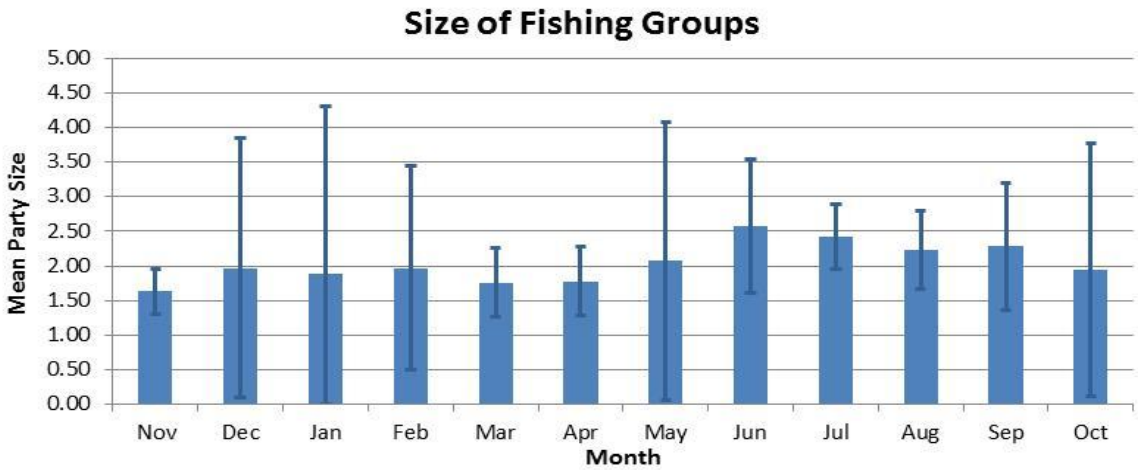

Figure 11. Fishing group size, by month, at Deerfield Reservoir, 1 November 2015 – 31 October 2016.

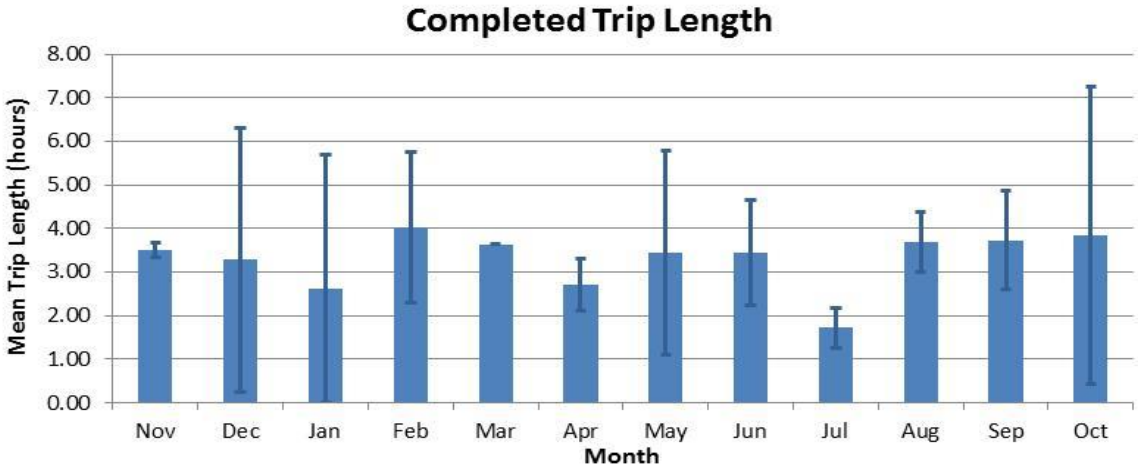

Figure 12. Mean trip lengths, by month, at Deerfield Reservoir, 1 November 2015 – 31 October 2016.

Targeted Species

The two most sought after fish in Deerfield Reservoir during the survey period were rainbow trout and yellow perch (Figure 13). Over 34% of all anglers interviewed indicated rainbow trout was their target sportfish while over 29% said they were targeting yellow perch. Deerfield also appears to have a large proportion of general anglers (22.7%) targeting anything they can catch and the newly introduced lake trout proved to be a popular target with almost 12% of the anglers fishing for this species.

In addition to a primary target species, many anglers fish for additional species during a trip, which was noted during this survey. Of 154 angling parties indicating they did have an additional target species, 50% were looking for rainbow trout (Figure 14). Yellow perch, lake trout and brook trout were also popular secondary species.

Targeted species by month indicated that spring, summer and fall months (i.e. April through November) were when most anglers were fishing for rainbow trout (Figure 15). During the winter months (i.e. December through March) most anglers were targeting yellow perch. Generalist anglers, or those targeting any species, were fishing the reservoir every month but were a large portion in the months of May, July and September (Figure 15).

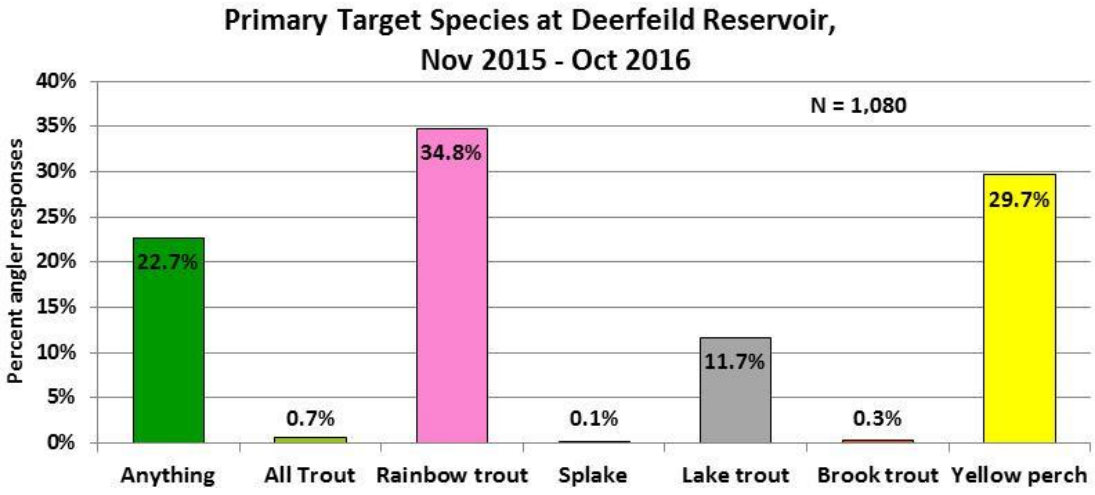

Figure 13. Primary species targeted by anglers at Deerfield Reservoir from November 1, 2015 through October 31, 2016.

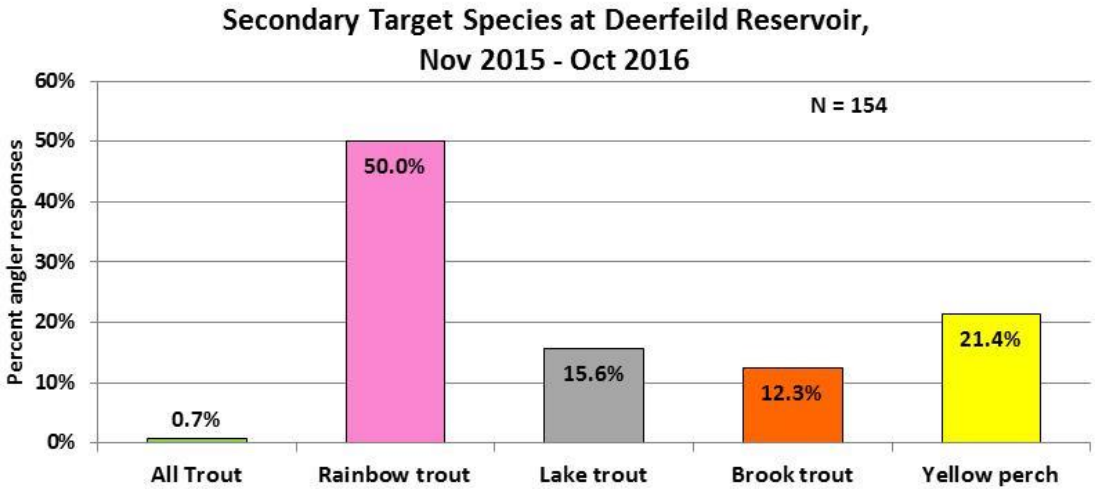

Figure 14. Secondary species targeted by anglers at Deerfield Reservoir from November 1, 2015 through October 31, 2016.

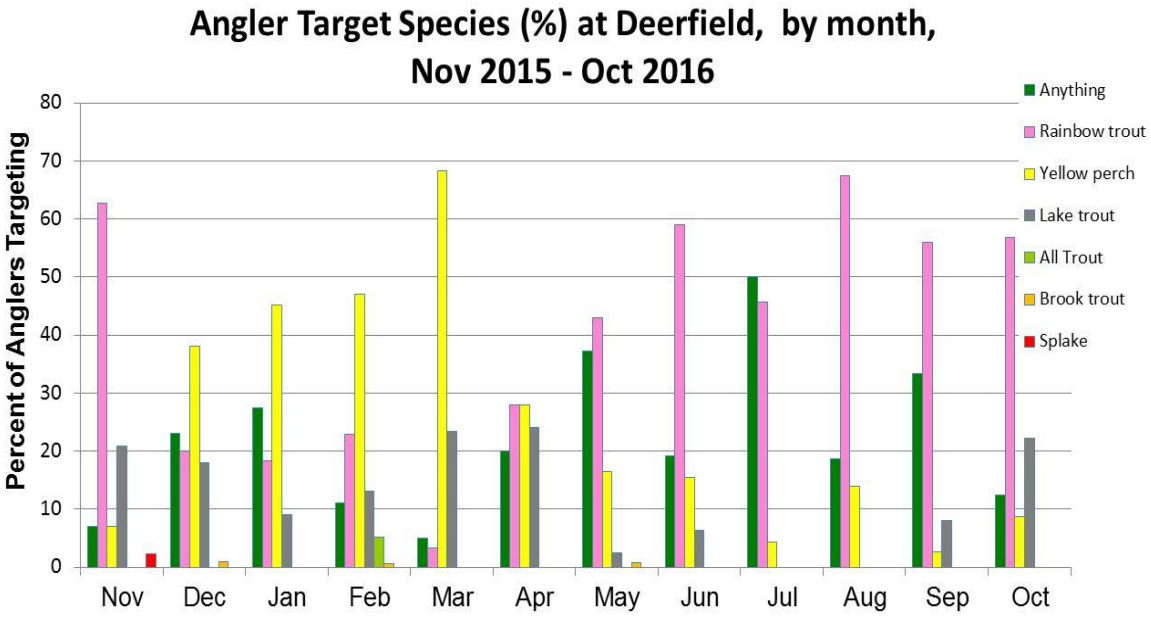

Figure 15. Monthly percent of anglers targeting specific species at Deerfield Reservoir from November 1, 2015 through October 31, 2016.

Catch and Harvest

Nine different fish species were caught by anglers during this twelve month survey with total estimated catch of all fish species at 83,427 fish and estimated harvest at 28,426 fish (Table 3). The most commonly caught sportfish, in descending order, were yellow perch, rock bass and rainbow trout. The most commonly harvested were yellow perch and rainbow trout. Lake trout, a recently introduced species, were the 5th most caught fish and 4th most harvested. The most commonly caught fish overall was rock bass, but the small percentage of harvest (>.01%) and lack of target anglers really indicates this is not a sportfish anglers are interested in at this reservoir.

Table 3. Estimated catch and harvest (80% confidence intervals in parentheses) at Deerfield Reservoir for all anglers, November 1, 2015 – October 31, 2016.

Species	Caught	Harvested
Brook trout*	5,090 (1,582)	929 (274)
Creek chub	240 (162)	0 (0)
Golden shiner	359 (450)	0 (0)
Lake trout	943 (269)	124 (59)
Rainbow trout	13,735 (2,021)	5,287 (1,009)
Rock bass	25,380 (3,831)	18 (18)
Splake trout*	283 (64)	64 (48)
White sucker	17 (11)	0 (0)
Yellow perch	37,380 (7,608)	22,004 (4,679)
Total	**83,427**	**28,426**

*Potential for overlap between these two species due to misidentification by anglers and angler survey clerks.

Brook Trout

Brook trout were targeted by a few anglers during this survey and were reportedly caught during every month. Highest catch was during January when 1,558 were estimated to be caught and catch tended to decrease by month throughout the rest of the year (Figure 16). The highest months for harvest were January and February when 233 and 253, respectively, were part of the estimated harvest.

Sizes of brook trout harvested by anglers were over 200 mm. Nearly all brook trout measured by creel clerks ranged from 210 mm to 300 mm with one larger fish observed over 370 mm (Figure 17).

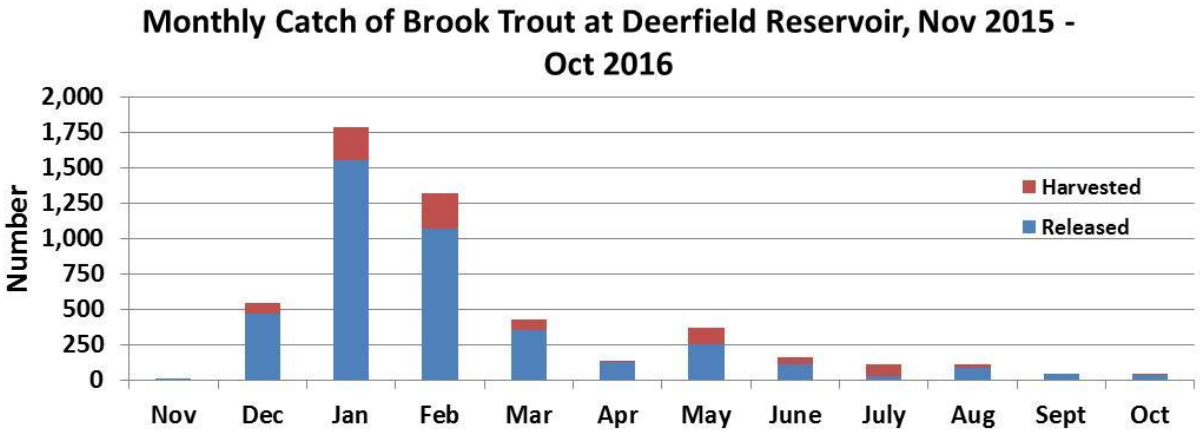

Figure 16. Estimates, by month, of number of brook trout caught and harvested from Deerfield Reservoir by all angler types from November 1, 2015 through October 31, 2016.

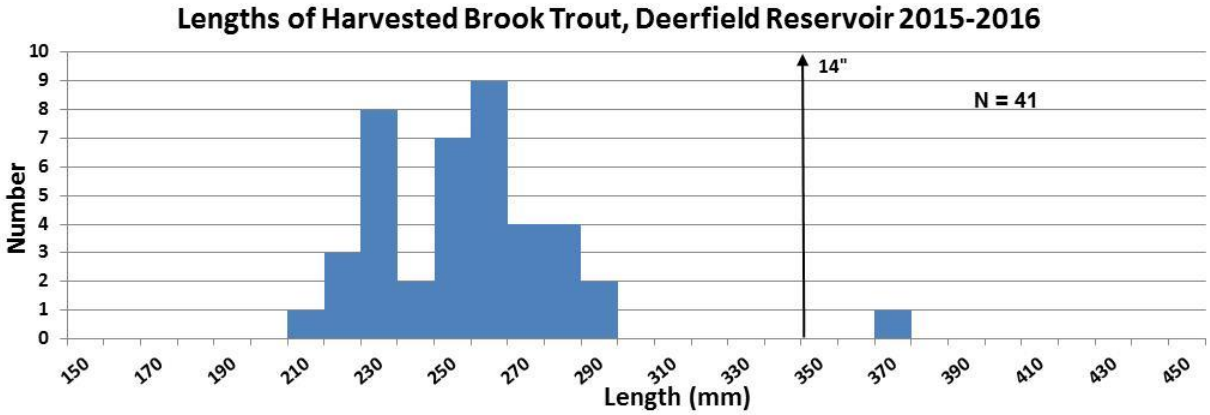

Figure 17. Length frequencies of brook trout harvested at Deerfield Reservoir by all angler types from November 1, 2016 through October 31, 2016.

Lake Trout

Lake trout catch was highest during the ice fishing season, especially in February (Figure 18). Estimated harvest over the 12-month survey was 124 lake trout (Table 3). Harvest was highest in January, but overall appeared rather low with only 10.6% of caught fish being harvested. The low harvest rate supports anglers' response to a question regarding thoughts about a restrictive regulation for lake trout. Anglers were asked if they would support a restriction similar to the current regulation at Pactola Reservoir (i.e. 1 fish daily and minimum length of 24 inches) and support was overwhelming with 97% of responses in favor (Figure 19).

Lengths of lake trout harvested were large and ranged from 480 mm to over 800 mm (Figure 20). These sizes reflected the large sizes of broodstock fish provided by Saratoga National Fish Hatchery.

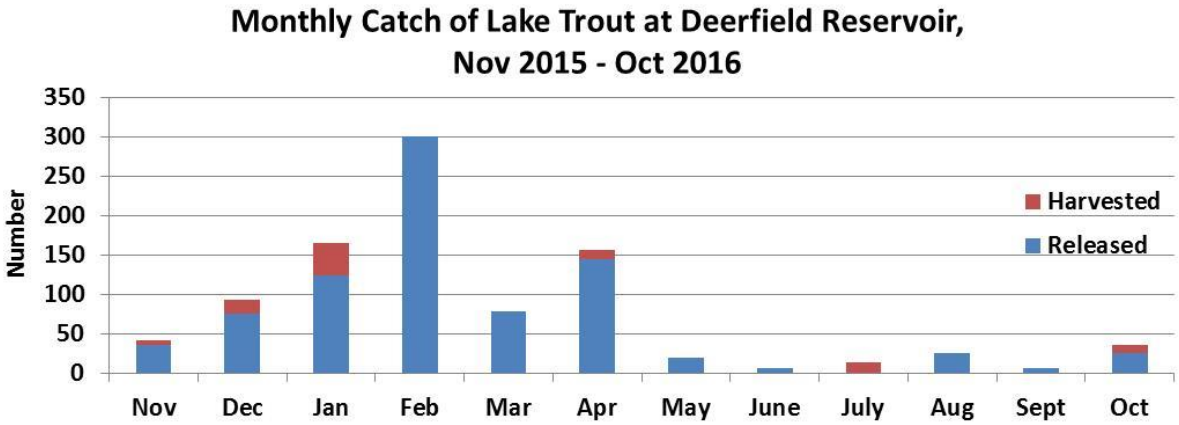

Figure 18. Estimates, by month, of number of lake trout caught and harvested from Deerfield Reservoir by all angler types from November 1, 2015 through October 31, 2016.

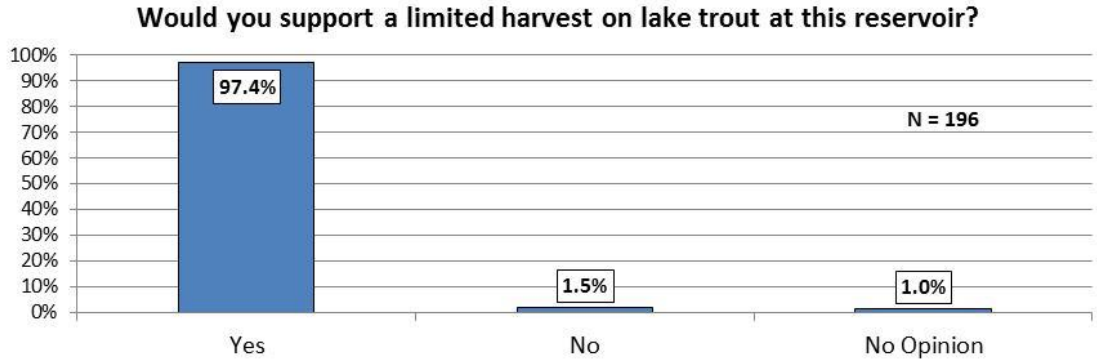

Figure 19. Response frequency to the question "Would you support a limited harvest on lake trout at this reservoir".

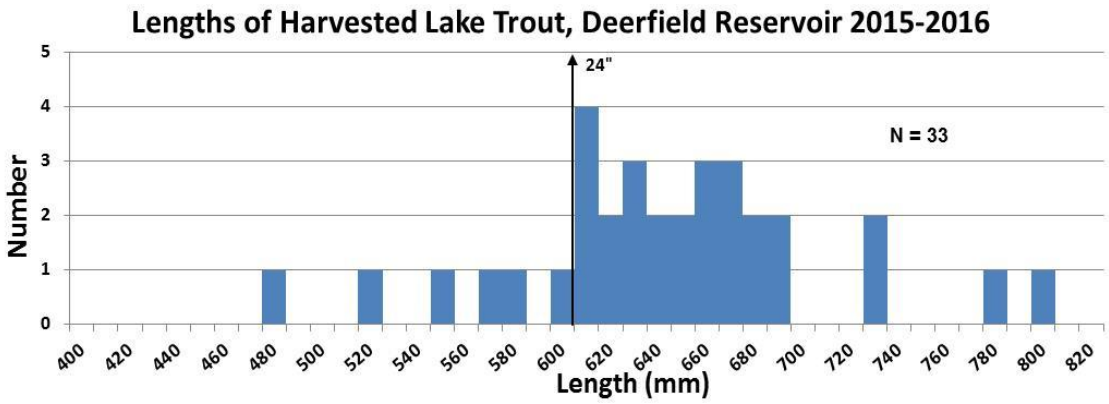

Figure 20. Length frequencies of lake trout harvested from Deerfield Reservoir by all angler types from November 1, 2015 through October 31, 2016.

Rainbow Trout

Rainbow trout are normally stocked in spring and late summer with the intent to keep angler catch high (Table 4). During this survey, anglers were asked how satisfied they were with the number of trout they caught and around 70% indicated they were either very satisfied or moderately satisfied (Figure 21). In addition to stocked fish, the high satisfaction could also be due in part to wild trout in the reservoir. Kientz (2016) confirmed wild rainbow trout in Deerfield Reservoir and suggested a sustainable population existed.

The highest estimated catch of rainbow trout occurred in January and February (Figure 22). During the open water season, catch increased substantially in May and continued through the summer. The months with lowest catch were the transitional months (November, December, March and April) between ice fishing and open water fishing. Estimated harvest during summer was highest in the months of July and August while the winter months of January and February also had high harvest (Figure 22).

Rainbow trout are generally raised in the hatchery to an average length of 280 mm (11 inches). Measured lengths of harvested rainbow trout ranged from 220 mm to 400 mm with a majority of the trout 290 mm to 350 mm, averaging above the 280 mm stocking size (Figure 23). Growth after stocking and variation in size of fish from the hatchery likely explains some of the increases over the average stocking size. In addition, Kientz's (2016) confirmation of wild rainbow trout could also explain some of the larger than expected sizes observed in anglers' creels.

Table 4. Rainbow trout stockings in Deerfield Reservoir, 2015 – 2016.

Date	Number
4/21/2015	3,000
6/2/2015	3,000
7/7/2015	3,000
9/1/2015	3,000
5/10/2016	4,500
8/18/2016	2,508
8/25/2016	2,508

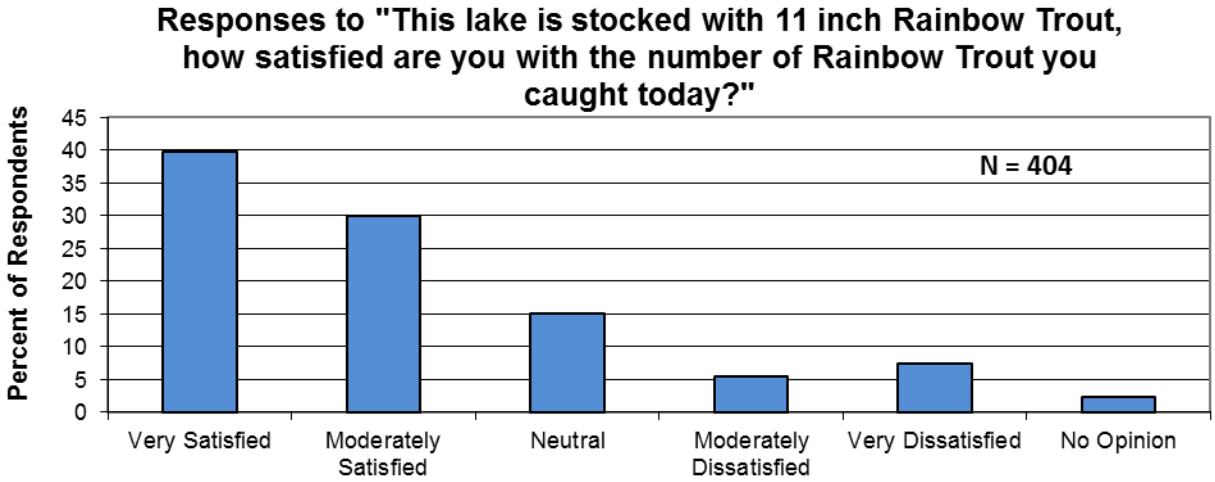

Figure 21. Responses, by percent, of anglers targeting rainbow trout to the question "This lake is stocked with 11 inch Rainbow Trout, how satisfied are you with the number of Rainbow Trout you caught today?"

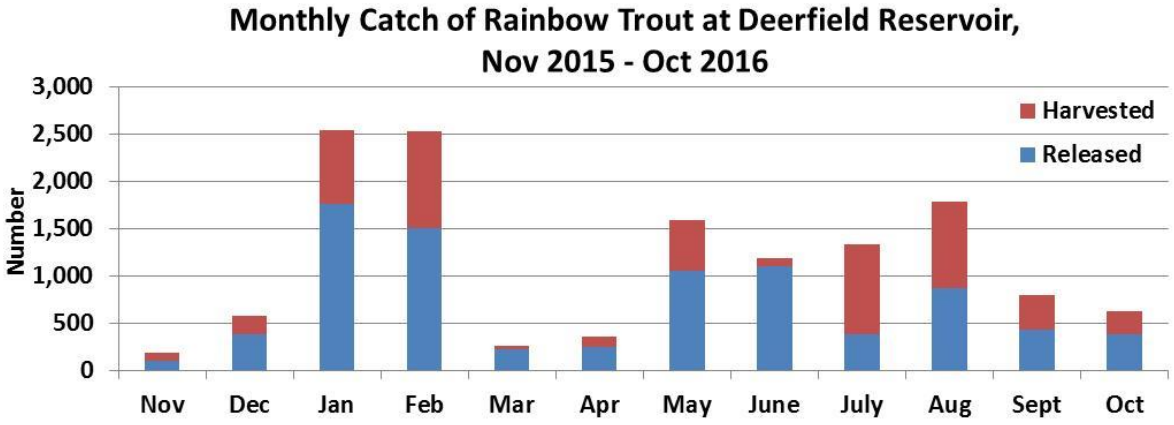

Figure 22. Estimates, by month, of number of rainbow trout caught and harvested from Deerfield Reservoir by all angler types from November 1, 2015 through October 31, 2016.

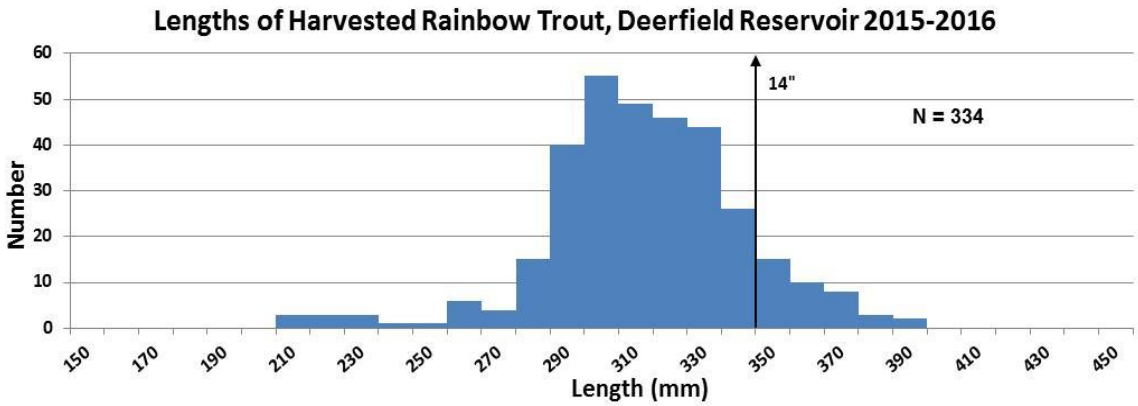

Figure 23. Length frequencies of rainbow trout harvested at Deerfield Reservoir by all angler types from November 1, 2015 through October 31, 2016.

Yellow Perch

Yellow perch are a highly harvested fish with almost 60% caught also being harvested (Table 3). While winter anglers heavily targeted yellow perch, the catch and harvest continued until August (Figures 15 and 24). February was the highest winter month of catch for ice anglers and June was the highest month for open water anglers. When asked about the number of yellow perch caught, anglers were indecisive. While a majority of anglers indicated that they were satisfied with the number of yellow perch caught (~55%), many anglers were not satisfied (35%)(Figure 25).

Yellow perch in Deerfield Reservoir tend to be small in size compared to populations across the state with annual surveys showing most fish less than 10 inches (South Dakota Department of Game, Fish and Parks, unpublished data). Most fish measured during this survey were just over 200 mm (8-inches) in length (Figure 26). To determine angler attitudes towards the size of yellow perch in the reservoir, anglers were asked if they were satisfied with the size of yellow perch they caught while fishing. Angler satisfaction was rather low with only around 35% answering they were satisfied and almost as many (30%) not satisfied (Figure 27).

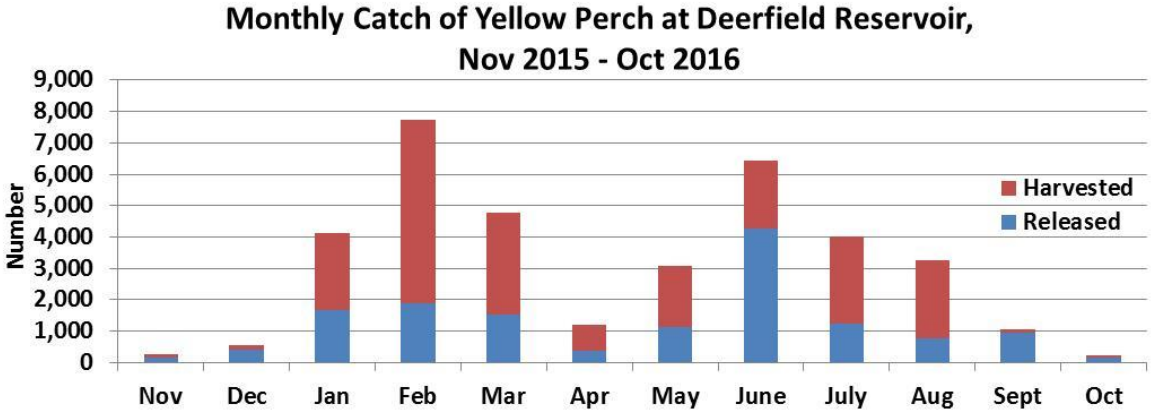

Figure 24. Estimates, by month, of number of yellow perch caught and harvested from Deerfield Reservoir by all angler types from November 1, 2015 through October 31, 2016.

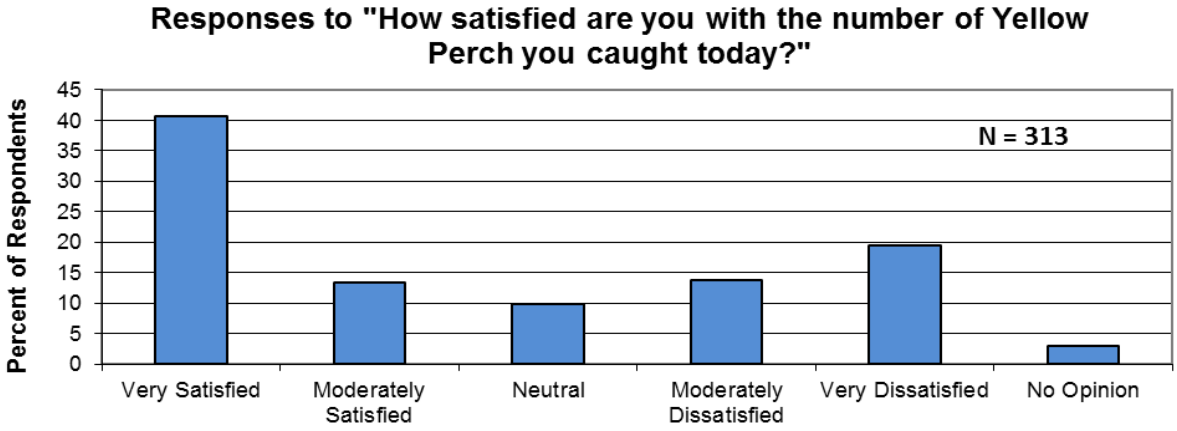

Figure 25. Responses, by percent, of anglers targeting yellow perch to the question "How satisfied are you with the number of Yellow Perch you caught today?"

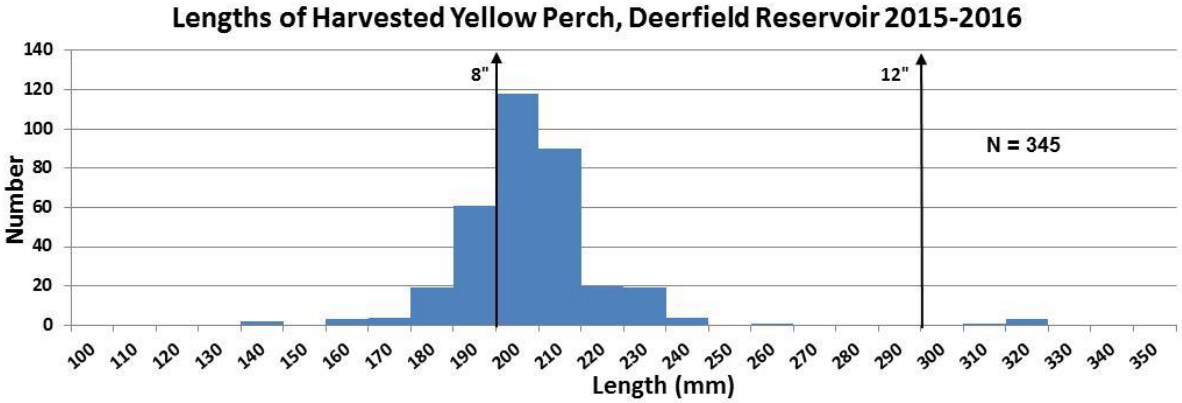

Figure 26. Length frequencies of yellow perch harvested from Deerfield Reservoir by all angler types from November 1, 2015 through October 31, 2016.

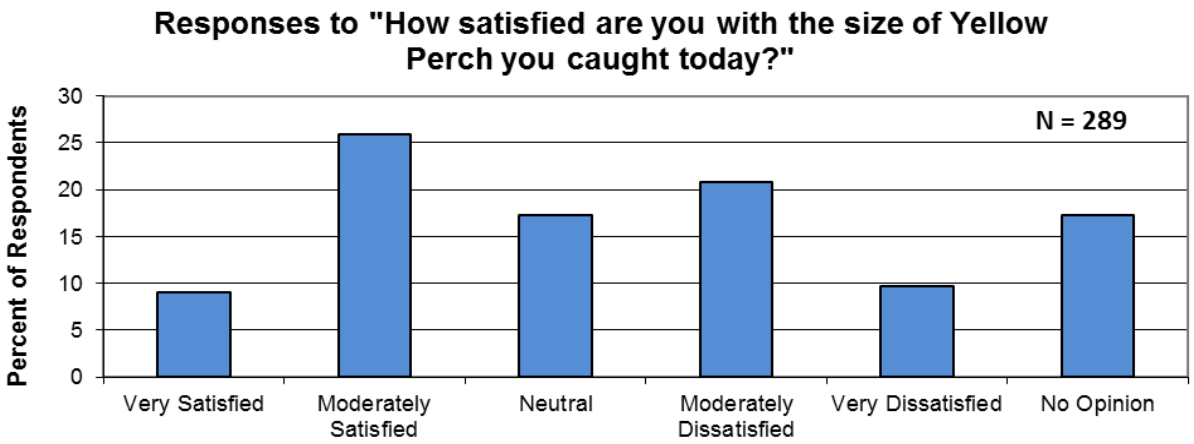

Figure 27. Responses, by percent, of anglers targeting yellow perch to the question "How satisfied are you with the size of Yellow Perch you caught today?"

Angler Trip Satisfaction

Overall, anglers fishing at Deerfield were satisfied with their daily fishing trip. Anglers were asked to consider all aspects of their fishing trip then given six choices to rate their trip for the day. Over 80% were at least moderately satisfied while less than 10% felt dissatisfied (Figure 28). Ten percent claimed the day was average or neutral.

All angling types appeared to have good feelings about their fishing (Table 5). The anglers with the highest rates of satisfaction were the open water anglers (i.e. boat and shore). Anglers fishing on open ice were mostly satisfied as well, but did have the largest percentage of dissatisfied anglers at 6.3%.

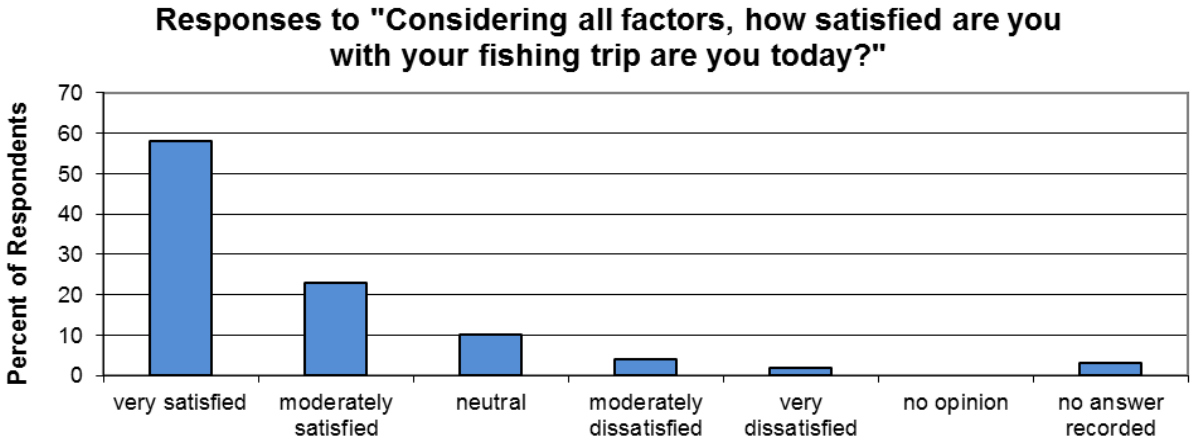

Figure 28. Total angler responses to the question "Considering all factors, how satisfied are you with your fishing trip today?" Anglers were given 6 answer choices: very satisfied, moderately satisfied, neutral, moderately dissatisfied, very dissatisfied and no opinion.

Table 5. Angler responses, by angling type, to the question "Considering all factors, how satisfied are you with your fishing trip today?" Anglers were given 6 answer choices: very satisfied, moderately satisfied, neutral, moderately dissatisfied, very dissatisfied and no opinion.

Answer Description	Boat		Shore		Open Ice		Ice Shanty	
	Count	%	Count	%	Count	%	Count	%
Very Satisfied	127	66.8	214	65.1	214	54.0	80	48.5
Moderately Satisfied	33	17.4	71	21.6	94	23.7	49	29.7
Neutral	12	6.3	20	6.1	52	13.1	23	13.9
Moderately Dissatisfied	7	3.7	14	4.3	16	4.0	7	4.2
Very Dissatisfied	4	2.1	3	0.9	9	2.3	1	0.6
No Opinion	0	0.0	0	0.0	1	0.3	0	0.0
No Answer	7	3.7	7	2.1	10	2.5	5	3.0

Angler Demographics

Deerfield anglers are predominately male and over 20 years old. Eighty-three percent of anglers interviewed throughout the 2015-2016 survey were male (Figure 29). Angler ages were separated into five age groups, with the 20-39 year old group being the largest (33.5%), over 60 year age group 26.8% and the 40-59 year age group was 24.7% (Figure 30). In total, these groups represented 85% of the anglers interviewed at Deerfield Reservoir.

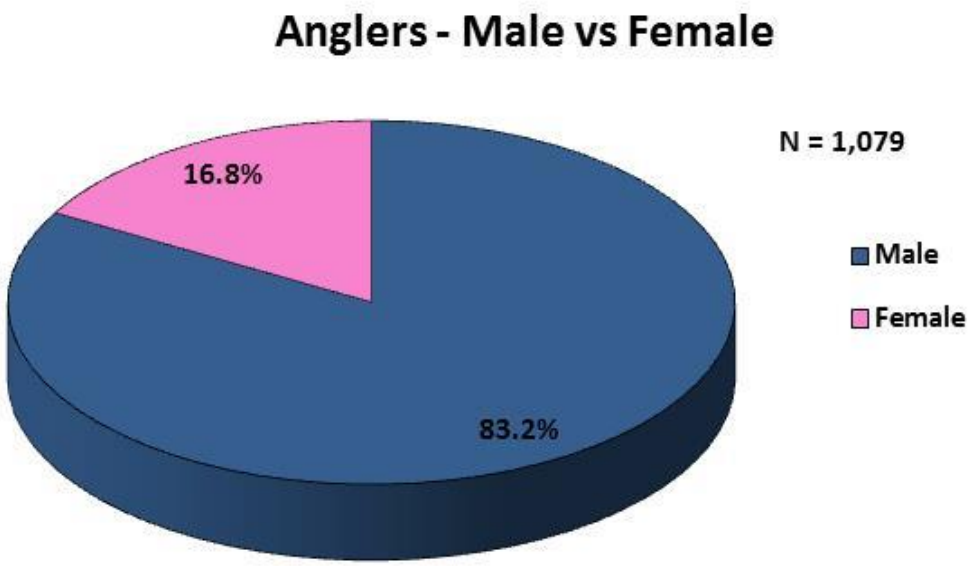

Figure 29. Percent of male anglers vs female anglers interviewed while fishing at Deerfield Reservoir, November 1, 2015 through October 31, 2016.

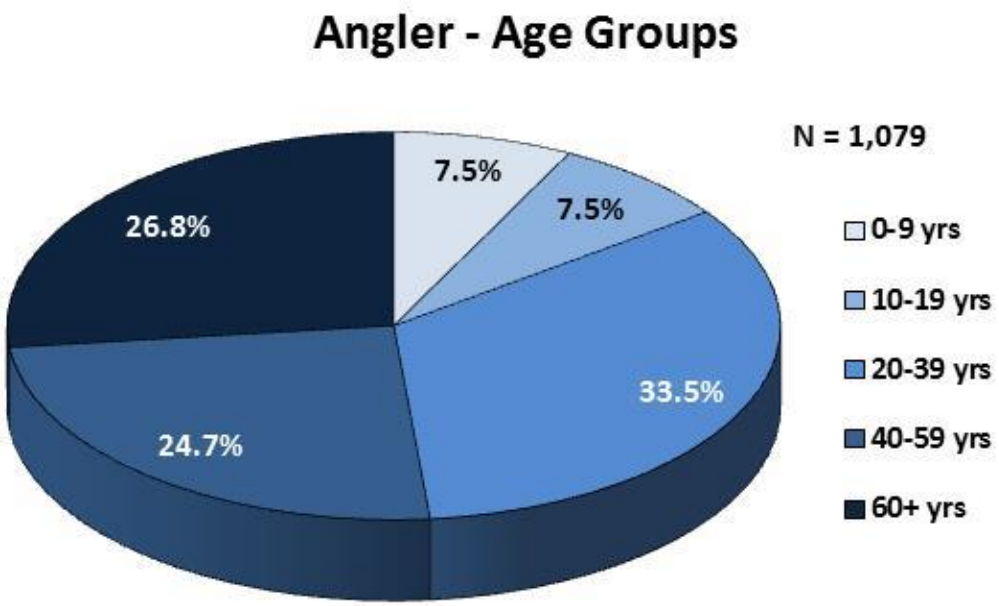

Figure 30. Percent of anglers by age group interviewed while fishing at Deerfield Reservoir, November 1, 2015 through October 31, 2016.

Angler Residence and Distance Traveled

Deerfield Reservoir anglers are primarily from South Dakota. Over 91% of interviewed anglers from November 1, 2015 through October 31, 2016 were South Dakota residents (Table 6). Anglers from thirteen other states were also represented. Nebraska, Wyoming and Minnesota were the next most common residents making up 4.7% of anglers. The other ten states combined made up 3.5% of all anglers.
In addition to being South Dakota residents, based on distance traveled to Deerfield Reservoir most anglers live within the Black Hills area. Over 50% of anglers traveled less than 25 miles and an additional 30% traveled less than 50 miles (Figure 31).

Table 6. Number and percent anglers, by state, interviewed at Deerfield Reservoir during 2015 and 2016.

State	Number of Anglers	Percent of Total	Percent of Non-residents
Arizona	7	0.65	7.87
California	1	0.09	1.12
Colorado	5	0.46	5.62
Illinois	4	0.37	4.49
Iowa	4	0.37	4.49
Minnesota	13	1.20	14.61
Montana	3	0.28	3.37
Nebraska	21	1.94	23.60
North Dakota	7	0.65	7.87
South Dakota	991	91.76	---
Texas	1	0.09	1.12
Washington	1	0.09	1.12
Wisconsin	5	0.46	5.62
Wyoming	17	1.57	19.10

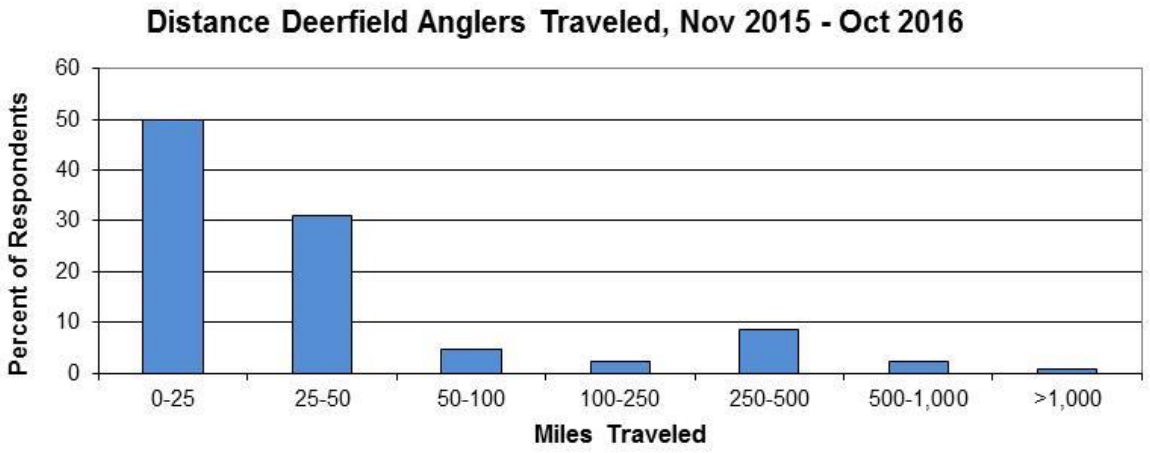

Figure 31. Percent of anglers by distance traveled to reach Deerfield Reservoir, November 1, 2015 through October 31, 2016.

CONCLUSION AND MANAGEMENT IMPLICATIONS

The lake trout appear to be surviving in Deerfield Reservoir with 44 different lake trout caught during the 2017 sampling. Condition of lake trout has declined since the initial stockings but appears to have reached a steady level. Possibly as these hatchery fish become more adapted to the forage in the reservoir or a natural population becomes established mean condition will improve. A strong possibility for a forage fish is rainbow smelt. Rainbow smelt already occur within the Rapid Creek watershed and were identified as an important part of diets for small (200-399 mm), intermediate (400-599 mm) and large (>600 mm) lake trout in Pactola Reservoir (Scheibel 2015) suggesting smelt could be an ideal forage fish for all sizes of lake trout in Deerfield.

Winter fishing is popular at Deerfield Reservoir. February was the month with the highest fishing pressure throughout the angler survey with January the second highest. Past angler surveys focused on the open water summer months and may have missed some of the highest angling months. Future angler surveys in Black Hills lakes, especially Deerfield, should include winter angling.

Anglers indicated they were satisfied with the number of trout they caught. The rainbow trout stocking times appear to address angling pressure fairly well but catch rates might be better improved by moving the last stocking into October. Open water angling begins to increase in May after the first stocking and a large percentage of anglers continue to target rainbow trout through the summer. The April or May stocking appears well timed and keeping with a second stocking in June would also appear to address angling pressure. The highest angling pressure occurred in the winter months of January and February however, stocking does not occur after ice up and the last stockings were in August or September. A stocking in late August or early September followed by another stocking in early to mid-October would appear to better address winter angling pressure at Deerfield.

Stocking the larger brood-stock lake trout has created a fishery that anglers would not have had available for possibly decades. During this angler survey an estimated 940 (±269; 80% CI) lake trout were caught and 119 (±58; 80% CI) harvested. Sizes of harvested lake trout ranged from 480 mm to 800 mm. The lake trout addition caught on quickly and a good portion of anglers (11.7%) were targeting them. Also, anglers are very accepting towards a more restrictive regulation on lake trout.

While rock bass were the second most caught fish, they were not discussed in detail in this report. Rock bass are not a target species and not a harvested species. Most comments about rock bass were negative and regarded anglers struggling to catch their target species due to incidental rock bass catch.

Yellow perch are an important fish species in Deerfield Reservoir. While there was no indication of yellow perch in the reservoir before 1998 the population grew quickly and are now the most targeted fish during winter angling. Any future regulations or stockings should address how they may affect the yellow perch fishery.

RECOMMENDATIONS

1. Revise and update the Deerfield Reservoir Fisheries Management Plan and include specific objectives and strategies regarding lake trout.
2. Keep with the mid-April and early June rainbow trout stocking dates. Also move the last stocking into early October to better address winter angling pressure.
3. Include fall trap netting in fish surveys to sample lake trout and splake and make the reports available on the Game, Fish and Parks website.
4. Conduct angler surveys every 5 to 10 years to assess angler attitudes and preferences towards the Deerfield fishery and publish the results as required by federal aid funding. Winter angling should be included in future angler surveys.
5. Continue to explore other species management (e.g. smallmouth bass or largemouth bass) or reduction methods that might address angler comments concerning overabundant small sized rock bass.
6. Lake trout anglers highly support a special regulation on lake trout similar to the Pactola regulation (24 inch minimum, one fish daily). During the next regulation process propose a special regulation for lake trout.
7. Investigate introducing fish, such as rainbow smelt, to add to the existing forage base.

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APPENDICES

South Dakota Department of Game, Fish and Parks
Deerfield Reservoir Fishing Pressure Report, 2015-2016

Form Pressure/Aerial or Roving or Fixed	
Pressure ID	
Data Entry into Creel Database	
Date Entered/Initials	Office Space Only

Pressure Count #1

Water Body	Date: Month	Date: Day	2015-2016	Survey Time (Military): Arrival	Survey Time (Military): Departure	Access Area	Creel Clerk	Air Temp	Cloud Cover	Wind Speed	Wind Dir	Precip	Water Temp	Ice thickness	Op Water (X)	Starting Location
0207																

Type Of Fishing	Total	Running Tally
Fishing Boats		
Bank/Shore		
Spearing		
Open Ice		
Ice Shack		

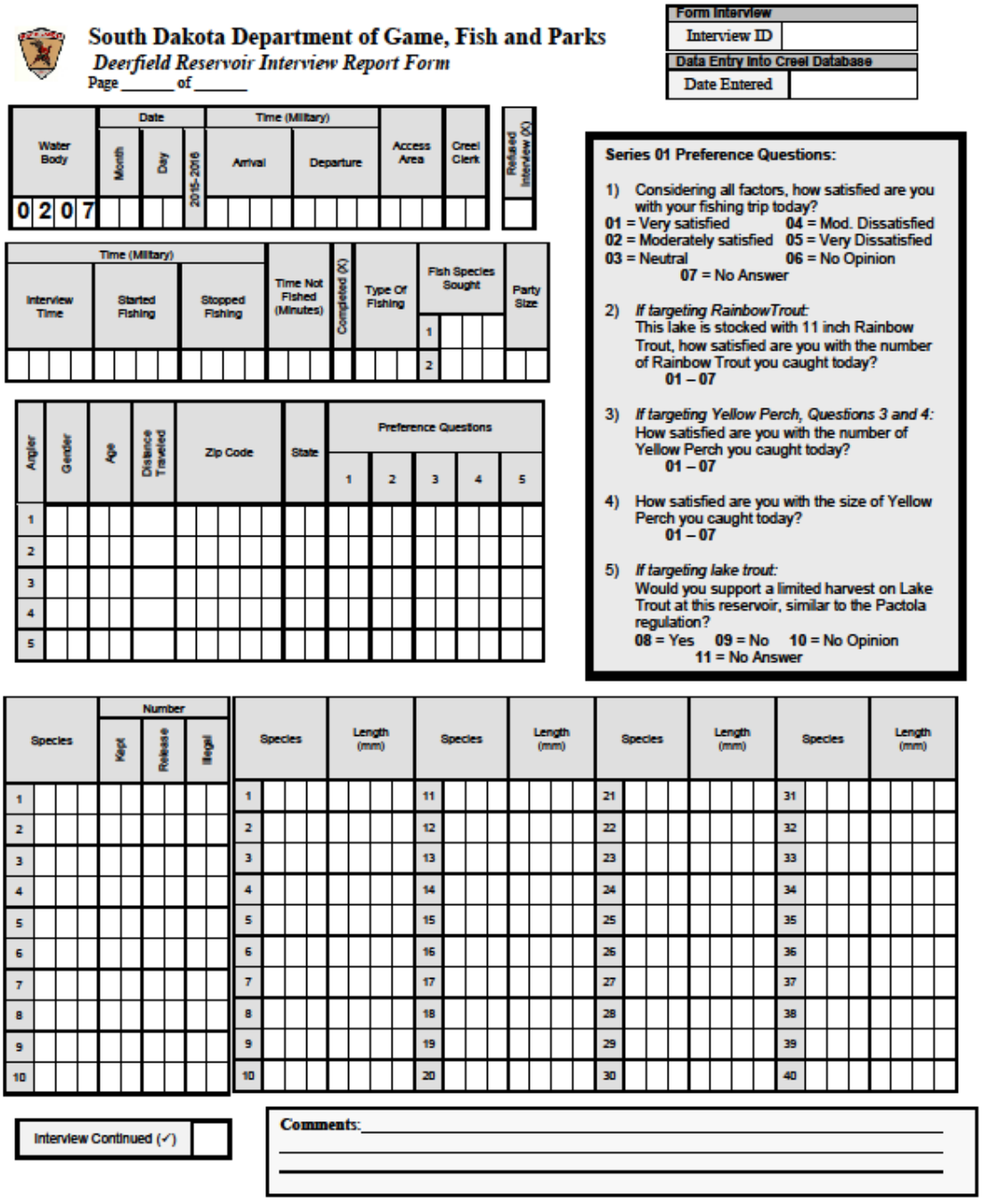
Pressure Count #2

Water Body	Date: Month	Date: Day	2015-2016	Survey Time (Military): Arrival	Survey Time (Military): Departure	Access Area	Creel Clerk	Air Temp	Cloud Cover	Wind Speed	Wind Dir	Precip	Water Temp	Ice thickness	Op Water (X)	Starting Location
0207																

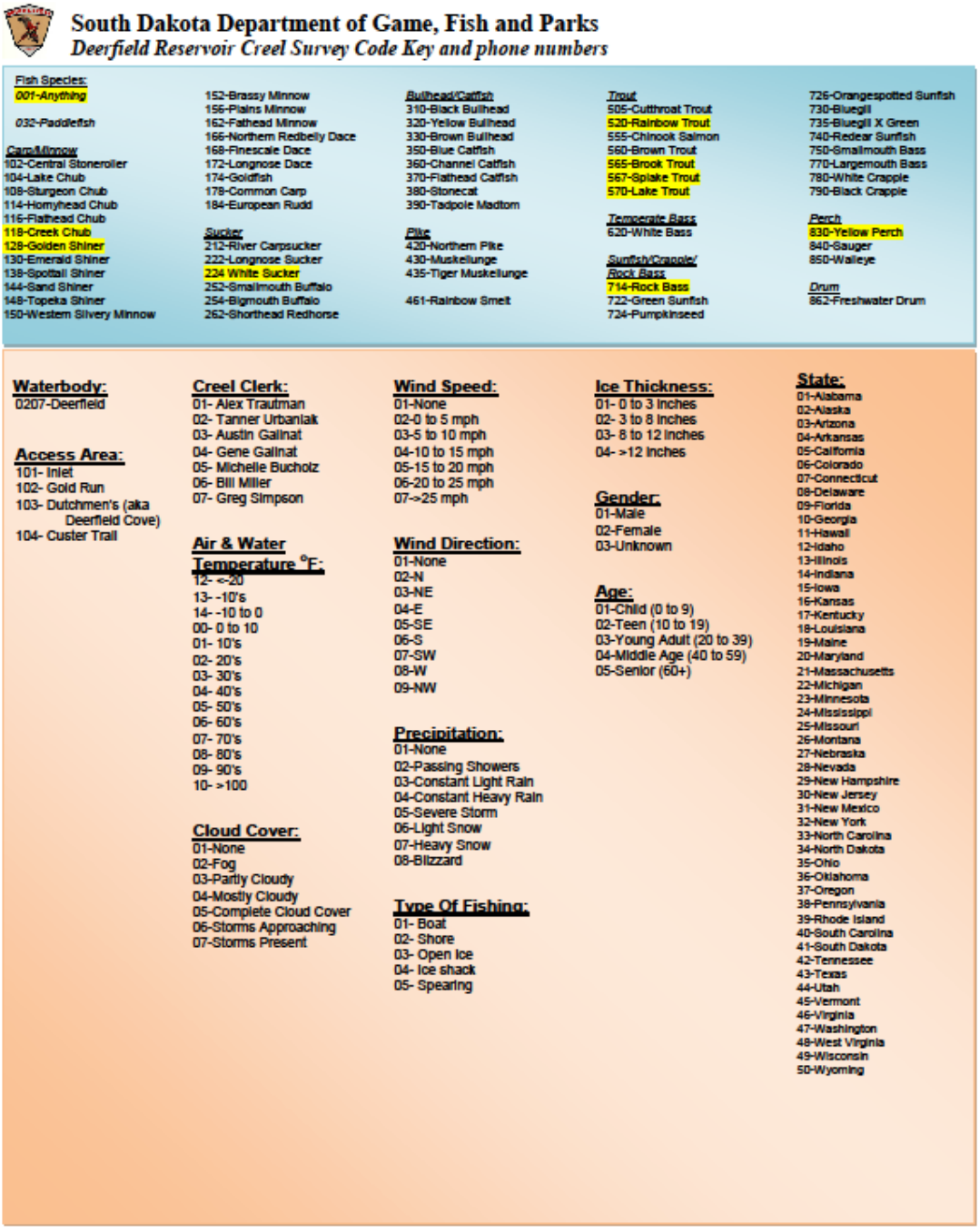
Type Of Fishing	Total	Running Tally
Fishing Boats		
Bank/Shore		
Spearing		
Open Ice		
Ice Shack		

COMMENTS:_____

Appendix Figure 1. Example Creel Survey Pressure Report form for Deerfield Reservoir, South Dakota, 2015-2016.



Appendix Figure 2. Example Creel Survey Interview Report form for Deerfield Reservoir, South Dakota, 2015-2016.



South Dakota Department of Game, Fish and Parks

Deerfield Reservoir Creel Survey Code Key and phone numbers

Fish Species:

001-Anything

032-Paddlefish

Carp/Minnow
102-Central Stoneroller
104-Lake Chub
108-Sturgeon Chub
114-Hornyhead Chub
116-Flathead Chub
118-Creek Chub
128-Golden Shiner
130-Emerald Shiner
138-Spottail Shiner
144-Sand Shiner
148-Topeka Shiner
150-Western Silvery Minnow
152-Brassy Minnow
156-Plains Minnow
162-Fathead Minnow
166-Northern Redbelly Dace
168-Finescale Dace
172-Longnose Dace
174-Goldfish
178-Common Carp
184-European Rudd

Sucker
212-River Carpsucker
222-Longnose Sucker
224 White Sucker
252-Smallmouth Buffalo
254-Bigmouth Buffalo
262-Shorthead Redhorse

Bullhead/Catfish
310-Black Bullhead
320-Yellow Bullhead
330-Brown Bullhead
350-Blue Catfish
360-Channel Catfish
370-Flathead Catfish
380-Stonecat
390-Tadpole Madtom

Pike
420-Northern Pike
430-Muskellunge
435-Tiger Muskellunge

461-Rainbow Smelt

Trout
505-Cutthroat Trout
520-Rainbow Trout
555-Chinook Salmon
560-Brown Trout
565-Brook Trout
567-Splake Trout
570-Lake Trout

Temperate Bass
620-White Bass

Sunfish/Crappie/ Rock Bass
714-Rock Bass
722-Green Sunfish
724-Pumpkinseed
726-Orangespotted Sunfish
730-Bluegill
735-Bluegill X Green
740-Redear Sunfish
750-Smallmouth Bass
770-Largemouth Bass
780-White Crappie
790-Black Crappie

Perch
830-Yellow Perch
840-Sauger
850-Walleye

Drum
862-Freshwater Drum

Waterbody:
0207-Deerfield

Access Area:
101- Inlet
102- Gold Run
103- Dutchmen's (aka Deerfield Cove)
104- Custer Trail

Creel Clerk:
01- Alex Trautman
02- Tanner Urbaniak
03- Austin Galinat
04- Gene Galinat
05- Michelle Bucholz
06- Bill Miller
07- Greg Simpson

Air & Water Temperature °F:
12- <-20
13- -10's
14- -10 to 0
00- 0 to 10
01- 10's
02- 20's
03- 30's
04- 40's
05- 50's
06- 60's
07- 70's
08- 80's
09- 90's
10- >100

Cloud Cover:
01-None
02-Fog
03-Partly Cloudy
04-Mostly Cloudy
05-Complete Cloud Cover
06-Storms Approaching
07-Storms Present

Wind Speed:
01-None
02-0 to 5 mph
03-5 to 10 mph
04-10 to 15 mph
05-15 to 20 mph
06-20 to 25 mph
07->25 mph

Wind Direction:
01-None
02-N
03-NE
04-E
05-SE
06-S
07-SW
08-W
09-NW

Precipitation:
01-None
02-Passing Showers
03-Constant Light Rain
04-Constant Heavy Rain
05-Severe Storm
06-Light Snow
07-Heavy Snow
08-Blizzard

Type Of Fishing:
01- Boat
02- Shore
03- Open Ice
04- Ice shack
05- Spearing

Ice Thickness:
01- 0 to 3 inches
02- 3 to 8 inches
03- 8 to 12 inches
04- >12 inches

Gender:
01-Male
02-Female
03-Unknown

Age:
01-Child (0 to 9)
02-Teen (10 to 19)
03-Young Adult (20 to 39)
04-Middle Age (40 to 59)
05-Senior (60+)

State:
01-Alabama
02-Alaska
03-Arizona
04-Arkansas
05-California
06-Colorado
07-Connecticut
08-Delaware
09-Florida
10-Georgia
11-Hawaii
12-Idaho
13-Illinois
14-Indiana
15-Iowa
16-Kansas
17-Kentucky
18-Louisiana
19-Maine
20-Maryland
21-Massachusetts
22-Michigan
23-Minnesota
24-Mississippi
25-Missouri
26-Montana
27-Nebraska
28-Nevada
29-New Hampshire
30-New Jersey
31-New Mexico
32-New York
33-North Carolina
34-North Dakota
35-Ohio
36-Oklahoma
37-Oregon
38-Pennsylvania
39-Rhode Island
40-South Carolina
41-South Dakota
42-Tennessee
43-Texas
44-Utah
45-Vermont
46-Virginia
47-Washington
48-West Virginia
49-Wisconsin
50-Wyoming

Appendix Figure 3. Creel Survey Code Key form for Deerfield Reservoir, South Dakota, 2015-2016.

Appendix Table 1. Total catch, harvest and release numbers (N), standard errors (SE), and confidence intervals (± %CI) totaled over all anglers and all days at Deerfield Reservoir, November 2015 – October 2016.

Waterbody	207 Deerfield Reservoir
Work Period	Totaled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September
Day Type	Totaled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)
Zone	Totaled Over: 1 -- Deerfield Reservoir
Type of Fishing	Totaled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shack, Spearing

		Catch				Harvest				Release			
Estimate Type	**Species**	**N**	**SE**	**80% CI**	**95% CI**	**N**	**SE**	**80% CI**	**95% CI**	**N**	**SE**	**80% CI**	**95% CI**
All Anglers	118	240.27	126.23	161.82	247.41	0.00	0.00	0.00	0.00	240.27	126.23	161.82	247.41
All Anglers	128	359.01	351.11	450.12	688.17	123.11	41.29	52.93	80.92	235.91	309.84	397.21	607.29
All Anglers	224	16.63	8.77	11.24	17.18	0.00	0.00	0.00	0.00	16.63	8.77	11.24	17.18
All Anglers	500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All Anglers	520	13,734.99	1,576.08	2,020.53	3,089.11	5,286.73	787.32	1,009.34	1,543.14	8,448.26	1,040.36	1,333.74	2,039.11
All Anglers	560	21.79	14.78	18.95	28.97	0.00	0.00	0.00	0.00	21.79	14.78	18.95	28.97
All Anglers	565	5,089.50	1,234.01	1,582.00	2,418.66	928.86	213.49	273.69	418.43	4,160.65	1,112.05	1,425.65	2,179.62
All Anglers	567	282.45	92.55	118.65	181.40	63.82	37.55	48.14	73.60	218.63	79.80	102.30	156.40
All Anglers	570	942.66	209.74	268.88	411.08	123.67	45.60	58.46	89.38	819.00	195.58	250.74	383.34
All Anglers	714	25,379.68	2,988.48	3,831.23	5,857.42	18.31	14.12	18.11	27.68	25,361.37	2,982.44	3,823.49	5,845.59
All Anglers	790	8.08	7.98	10.23	15.63	0.00	0.00	0.00	0.00	8.08	7.98	10.23	15.63
All Anglers	814	5.09	6.56	8.41	12.86	0.00	0.00	0.00	0.00	5.09	6.56	8.41	12.86
All Anglers	830	37,379.59	5,934.78	7,608.39	11,632.17	22,004.36	3,649.74	4,678.96	7,153.48	15,375.23	2,768.33	3,549.00	5,425.93
Overall		83,459.75	9,043.09	11,593.24	17,724.45	28,548.86	4,394.24	5,633.42	8,612.71	54,910.89	6,432.41	8,246.35	12,607.52

Appendix Table 2. Monthly catch, harvest and release numbers (N), standard errors (SE), and confidence intervals (± %CI) totaled over all anglers and all days at Deerfield Reservoir, November 2015 – October 2016.

Waterbody	207 Deerfield Reservoir
Day Type	Totaled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)
Zone	Totaled Over: 1 -- Deerfield Reservoir
Type of Fishing	Totaled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shack, Spearing

			Catch				Harvest				Release			
Work Period	Estimate Type	Species	N	SE	80% CI	95% CI	N	SE	80% CI	95% CI	N	SE	80% CI	95% CI
1	All Anglers	224	9.48	8.77	11.24	17.18	0.00	0.00	0.00	0.00	9.48	8.77	11.24	17.18
	All Anglers	520	2,524.30	560.13	718.08	1,097.85	759.79	155.53	199.39	304.83	1,764.51	443.31	568.32	868.89
	All Anglers	560	9.48	8.77	11.24	17.18	0.00	0.00	0.00	0.00	9.48	8.77	11.24	17.18
	All Anglers	565	1,791.18	993.06	1,273.11	1,946.41	233.18	74.38	95.35	145.78	1,558.00	959.29	1,229.80	1,880.20
	All Anglers	567	44.82	24.66	31.62	48.34	13.55	10.83	13.88	21.22	31.28	18.14	23.26	35.56
	All Anglers	570	165.11	61.14	78.39	119.84	40.91	19.52	25.03	38.27	124.20	44.97	57.65	88.14
	All Anglers	714	1,478.52	806.38	1,033.78	1,580.50	0.00	0.00	0.00	0.00	1,478.52	806.38	1,033.78	1,580.50
	All Anglers	830	4,132.42	858.51	1,100.60	1,682.67	2,445.05	421.72	540.65	826.58	1,687.36	558.68	716.23	1,095.01
	Overall		10,155.32	2,205.51	2,827.46	4,322.80	3,492.48	565.40	724.84	1,108.18	6,662.83	1,771.59	2,271.17	3,472.31
2	All Anglers	500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	All Anglers	520	2,524.16	665.92	853.71	1,305.20	1,018.24	334.79	429.20	656.19	1,505.92	537.55	689.14	1,053.59
	All Anglers	560	12.31	11.90	15.26	23.33	0.00	0.00	0.00	0.00	12.31	11.90	15.26	23.33
	All Anglers	565	1,325.71	631.69	809.82	1,238.11	252.89	161.14	206.58	315.82	1,072.82	460.90	590.88	903.37
	All Anglers	567	73.61	50.59	64.85	99.15	35.03	29.44	37.74	57.70	38.58	32.65	41.85	63.99
	All Anglers	570	300.27	144.12	184.77	282.48	0.00	0.00	0.00	0.00	300.27	144.12	184.77	282.48
	All Anglers	714	783.79	260.34	333.75	510.26	0.00	0.00	0.00	0.00	783.79	260.34	333.75	510.26
	All Anglers	830	7,734.22	4,536.84	5,816.23	8,892.21	5,855.60	2,962.97	3,798.53	5,807.42	1,878.62	1,006.08	1,289.79	1,971.91
	Overall		12,754.07	4,506.28	5,777.05	8,832.31	7,161.76	3,540.69	4,539.17	6,939.76	5,592.32	1,383.24	1,773.31	2,711.14
3	All Anglers	520	256.27	161.12	206.56	315.80	29.11	19.00	24.36	37.24	227.16	143.92	184.51	282.09
	All Anglers	565	427.92	275.00	352.55	539.00	75.51	50.85	65.19	99.66	352.41	260.48	333.94	510.55
	All Anglers	567	35.19	30.81	39.50	60.38	0.00	0.00	0.00	0.00	35.19	30.81	39.50	60.38
	All Anglers	570	77.93	43.36	55.59	84.99	0.00	0.00	0.00	0.00	77.93	43.36	55.59	84.99
	All Anglers	714	223.81	171.82	220.28	336.77	5.76	6.77	8.68	13.26	218.05	171.88	220.35	336.89
	All Anglers	830	4,775.07	2,340.93	3,001.07	4,588.22	3,263.58	1,658.86	2,126.66	3,251.37	1,511.48	782.01	1,002.54	1,532.75
	Overall		5,796.18	2,682.43	3,438.88	5,257.57	3,373.97	1,719.21	2,204.03	3,369.65	2,422.21	1,094.02	1,402.54	2,144.29
4	All Anglers	520	358.69	168.94	216.58	331.12	104.34	60.87	78.04	119.31	254.35	121.20	155.38	237.55
	All Anglers	565	137.39	76.53	98.12	150.01	12.01	10.40	13.33	20.39	125.38	75.82	97.21	148.62
	All Anglers	567	10.30	14.39	18.45	28.21	0.00	0.00	0.00	0.00	10.30	14.39	18.45	28.21
	All Anglers	570	155.81	109.05	139.81	213.75	12.13	10.43	13.37	20.44	143.69	99.27	127.26	194.56
	All Anglers	714	39.57	43.17	55.35	84.62	0.00	0.00	0.00	0.00	39.57	43.17	55.35	84.62
	All Anglers	830	1,186.29	634.60	813.56	1,243.82	823.82	603.61	773.83	1,183.07	362.47	44.68	57.28	87.57
	Overall		1,888.04	817.41	1,047.92	1,602.13	952.29	606.72	777.82	1,189.18	935.75	288.03	369.26	564.54
5	All Anglers	118	27.80	24.94	31.97	48.88	0.00	0.00	0.00	0.00	27.80	24.94	31.97	48.88
	All Anglers	128	259.25	350.94	449.91	687.85	30.50	41.29	52.93	80.92	228.75	309.66	396.98	606.93
	All Anglers	520	1,590.93	492.70	631.64	965.68	538.83	297.04	380.81	582.21	1,052.10	352.72	452.19	691.34
	All Anglers	565	368.66	70.57	90.47	138.32	114.36	61.67	79.06	120.88	254.30	22.48	28.82	44.05
	All Anglers	567	113.04	65.04	83.39	127.49	15.25	20.64	26.47	40.46	97.79	61.68	79.07	120.89
	All Anglers	570	20.48	17.66	22.65	34.62	0.00	0.00	0.00	0.00	20.48	17.66	22.65	34.62
	All Anglers	714	2,434.73	1,533.75	1,966.27	3,006.16	12.55	12.40	15.89	24.30	2,422.18	1,521.95	1,951.14	2,983.03
	All Anglers	830	3,083.38	794.44	1,018.47	1,557.11	1,945.72	154.66	198.28	303.14	1,137.66	1,395.69	1,789.28	2,735.56
	Overall		7,898.26	4,936.70	6,328.85	9,675.94	2,657.21	1,037.83	1,330.50	2,034.14	5,241.05	4,603.36	5,901.51	9,022.59

Appendix Table 2. Continued.

6	All Anglers	118	212.47	123.74	158.63	242.53	0.00	0.00	0.00	0.00	212.47	123.74	158.63	242.53
	All Anglers	128	7.16	10.67	13.67	20.91	0.00	0.00	0.00	0.00	7.16	10.67	13.67	20.91
	All Anglers	224	7.16	---	---	---	0.00	---	---	---	7.16	---	---	---
	All Anglers	520	1,182.89	516.30	661.90	1,011.95	79.12	51.11	65.53	100.18	1,103.77	459.11	588.58	899.86
	All Anglers	565	164.17	100.82	129.26	197.61	51.08	42.00	53.85	82.32	113.08	89.92	115.27	176.24
	All Anglers	570	7.16	9.74	12.48	19.09	0.00	0.00	0.00	0.00	7.16	9.74	12.48	19.09
	All Anglers	714	7,601.75	1,648.44	2,113.30	3,230.94	0.00	0.00	0.00	0.00	7,601.75	1,648.44	2,113.30	3,230.94
	All Anglers	830	6,417.78	2,124.37	2,723.45	4,163.77	2,141.41	1,011.85	1,297.19	1,983.22	4,276.38	1,438.08	1,843.62	2,818.64
	Overall		15,600.52	3,481.56	4,463.36	6,823.86	2,271.60	1,088.96	1,396.04	2,134.35	13,328.92	2,537.21	3,252.70	4,972.93
7	All Anglers	128	92.61	---	---	---	92.61	---	---	---	0.00	---	---	---
	All Anglers	520	1,336.27	471.00	603.82	923.15	957.08	304.49	390.36	596.81	379.20	178.99	229.46	350.82
	All Anglers	565	114.85	65.91	84.50	129.19	87.62	60.95	78.14	119.47	27.23	25.09	32.16	49.17
	All Anglers	570	13.61	12.54	16.08	24.59	13.61	12.54	16.08	24.59	0.00	0.00	0.00	0.00
	All Anglers	714	6,053.52	1,047.62	1,343.05	2,053.33	0.00	0.00	0.00	0.00	6,053.52	1,047.62	1,343.05	2,053.33
	All Anglers	830	4,971.40	1,619.54	2,076.25	3,174.29	2,791.27	412.24	528.50	808.00	2,180.13	1,230.74	1,577.81	2,412.25
	Overall		12,582.27	3,010.20	3,859.08	5,899.99	3,942.19	772.04	989.76	1,513.20	8,640.08	2,320.34	2,974.68	4,547.87
8	All Anglers	520	1,780.43	781.13	1,001.41	1,531.01	915.07	497.53	637.84	975.16	865.35	345.55	443.00	677.29
	All Anglers	565	111.86	34.01	43.60	66.66	24.56	34.01	43.60	66.66	87.30	0.00	0.00	0.00
	All Anglers	570	24.56	34.01	43.60	66.66	24.56	34.01	43.60	66.66	0.00	0.00	0.00	0.00
	All Anglers	714	5,418.58	1,393.30	1,786.21	2,730.87	0.00	0.00	0.00	0.00	5,418.58	1,393.30	1,786.21	2,730.87
	All Anglers	830	3,254.98	316.57	405.84	620.47	2,467.78	118.85	152.37	232.95	787.19	261.59	335.36	512.73
	Overall		10,590.41	1,515.62	1,943.02	2,970.61	3,431.98	446.35	572.22	874.84	7,158.43	1,281.88	1,643.38	2,512.49
9	All Anglers	520	798.39	256.37	328.66	502.48	369.32	157.11	201.41	307.93	429.07	112.02	143.61	219.56
	All Anglers	565	48.32	20.33	26.06	39.84	0.00	0.00	0.00	0.00	48.32	20.33	26.06	39.84
	All Anglers	570	6.83	7.11	9.12	13.94	0.00	0.00	0.00	0.00	6.83	7.11	9.12	13.94
	All Anglers	714	879.34	218.92	280.65	429.07	0.00	0.00	0.00	0.00	879.34	218.92	280.65	429.07
	All Anglers	830	1,057.49	192.33	246.56	376.96	96.64	95.15	121.98	186.49	960.85	192.33	246.56	376.96
	Overall		2,790.38	493.33	632.44	966.92	465.96	123.18	157.92	241.44	2,324.42	289.07	370.59	566.58
10	All Anglers	520	623.98	453.40	581.26	888.67	245.80	87.67	112.39	171.83	378.18	246.21	315.64	482.58
	All Anglers	565	41.69	18.55	23.78	36.36	4.32	3.30	4.23	6.47	37.37	18.70	23.98	36.66
	All Anglers	567	2.58	2.78	3.57	5.45	0.00	0.00	0.00	0.00	2.58	2.78	3.57	5.45
	All Anglers	570	36.37	19.96	25.59	39.12	10.29	6.84	8.77	13.41	26.08	17.15	21.98	33.61
	All Anglers	714	301.43	128.25	164.42	251.37	0.00	0.00	0.00	0.00	301.43	128.25	164.42	251.37
	All Anglers	814	5.09	6.56	8.41	12.86	0.00	0.00	0.00	0.00	5.09	6.56	8.41	12.86
	All Anglers	830	227.35	119.23	152.85	233.69	54.24	45.23	57.99	88.66	173.10	116.73	149.65	228.80
	Overall		1,238.49	500.69	641.88	981.35	314.65	118.63	152.09	232.52	923.84	337.37	432.51	661.24
11	All Anglers	520	187.66	103.02	132.08	201.93	82.80	63.98	82.03	125.41	104.87	40.64	52.10	79.66
	All Anglers	560	0.00	---	---	---	0.00	---	---	---	0.00	---	---	---
	All Anglers	565	10.84	11.24	14.41	22.03	0.00	0.00	0.00	0.00	10.84	11.24	14.41	22.03
	All Anglers	570	41.44	27.18	34.85	53.28	4.60	4.84	6.20	9.48	36.83	26.49	33.96	51.92
	All Anglers	714	9.21	6.14	7.87	12.03	0.00	0.00	0.00	0.00	9.21	6.14	7.87	12.03
	All Anglers	830	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Overall		249.15	116.54	149.41	228.42	87.40	63.98	82.02	125.40	161.75	58.81	75.40	115.28
12	All Anglers	520	571.01	221.57	284.05	434.28	187.24	109.37	140.22	214.37	383.77	---	---	---
	All Anglers	565	546.92	185.90	238.32	364.37	73.32	30.59	39.21	59.95	473.60	142.43	182.59	279.16
	All Anglers	567	2.92	1.96	2.51	3.84	0.00	0.00	0.00	0.00	2.92	1.96	2.51	3.84
	All Anglers	570	93.09	52.89	67.80	103.66	17.56	14.33	18.37	28.08	75.53	47.66	61.09	93.41
	All Anglers	714	155.43	92.98	119.20	182.25	0.00	0.00	0.00	0.00	155.43	92.98	119.20	182.25

Appendix Table 3. Annual observed and estimated total fishing pressure (P, h), standard errors (SE) and confidence intervals (± %CI) totaled over all days and all anglers, Deerfield Reservoir, November 2015 – October 2016.

Waterbody	207 Deerfield Reservoir
Work Period	Totaled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September
Day Type	Totaled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)
Zone	Totaled Over: 1 -- Deerfield Reservoir
Type of Fishing	Totaled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shack, Spearing

Observed				Total			
P	**SE**	**80% CI**	**95% CI**	**P**	**SE**	**80% CI**	**95% CI**
25,716.92	2,013.13	2,580.84	3,945.743	6,760.51	3,001.63	3,848.09	5,883.20

Appendix Table 4. Monthly observed and total fishing pressure (P, h), standard errors (SE) and confidence intervals (± %CI) totaled over all days and all anglers, Deerfield Reservoir, November 2015 – October 2016.

Waterbody	207 Deerfield Reservoir
Day Type	Totaled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)
Zone	Totaled Over: 1 -- Deerfield Reservoir
Type of Fishing	Totaled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shack, Spearing

	Observed				Total			
Work Period	**P**	**SE**	**80% CI**	**95% CI**	**P**	**SE**	**80% CI**	**95% CI**
1	3,891.09	666.58	854.56	1,306.50	5,437.25	779.65	999.51	1,528.12
2	5,738.74	1,006.05	1,289.76	1,971.86	8,711.87	1,887.56	2,419.85	3,699.61
3	1,673.32	799.10	1,024.45	1,566.25	1,802.81	873.27	1,119.54	1,711.62
4	1,064.47	349.20	447.67	684.43	1,198.97	428.31	549.09	839.48
5	2,767.32	997.63	1,278.96	1,955.36	3,476.78	1,319.04	1,691.01	2,585.32
6	2,838.69	411.67	527.77	806.88	3,931.38	608.96	780.69	1,193.56
7	2,925.98	483.72	620.13	948.09	5,324.21	929.90	1,192.13	1,822.60
8	1,639.40	389.74	499.65	763.89	2,639.00	655.41	840.24	1,284.61
9	892.25	265.88	340.86	521.12	1,388.37	420.04	538.49	823.28
10	655.63	140.48	180.09	275.34	913.22	204.22	261.81	400.26
11	243.18	75.63	96.96	148.24	243.18	75.63	96.96	148.24
12	1,386.83	434.68	557.26	851.97	1,693.48	513.97	658.91	1,007.38

Appendix Table 5. Target species (primary or secondary) frequency for all anglers.

Waterbody	207 Deerfield Reservoir
Work Period	Totaled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September
Day Type	Totaled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)
Zone	Totaled Over: 1 -- Deerfield Reservoir
Type of Fishing	Totaled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shack, Spearing
Interviews (n)	1,080
Secondary Responses	154
Total Responses	1,234

Level (Primary or Secondary) Species	Code	Count	Percent (%) Primary	Secondary	Total
1	1	245	22.69	---	19.85
	500	8	0.74	---	0.65
	520	376	34.81	---	30.47
	560	1	0.09	---	0.08
	565	3	0.28	---	0.24
	570	126	11.67	---	10.21
	830	321	29.72	---	26.01
2	500	1	---	0.65	0.08
	520	77	---	50.00	6.24
	565	19	---	12.34	1.54
	570	24	---	15.58	1.94
	830	33	---	21.43	2.67